VOLUME XVIII JANUARY, 1918 NUMBER

THE AMERICAN MUSEUM JOURNAL

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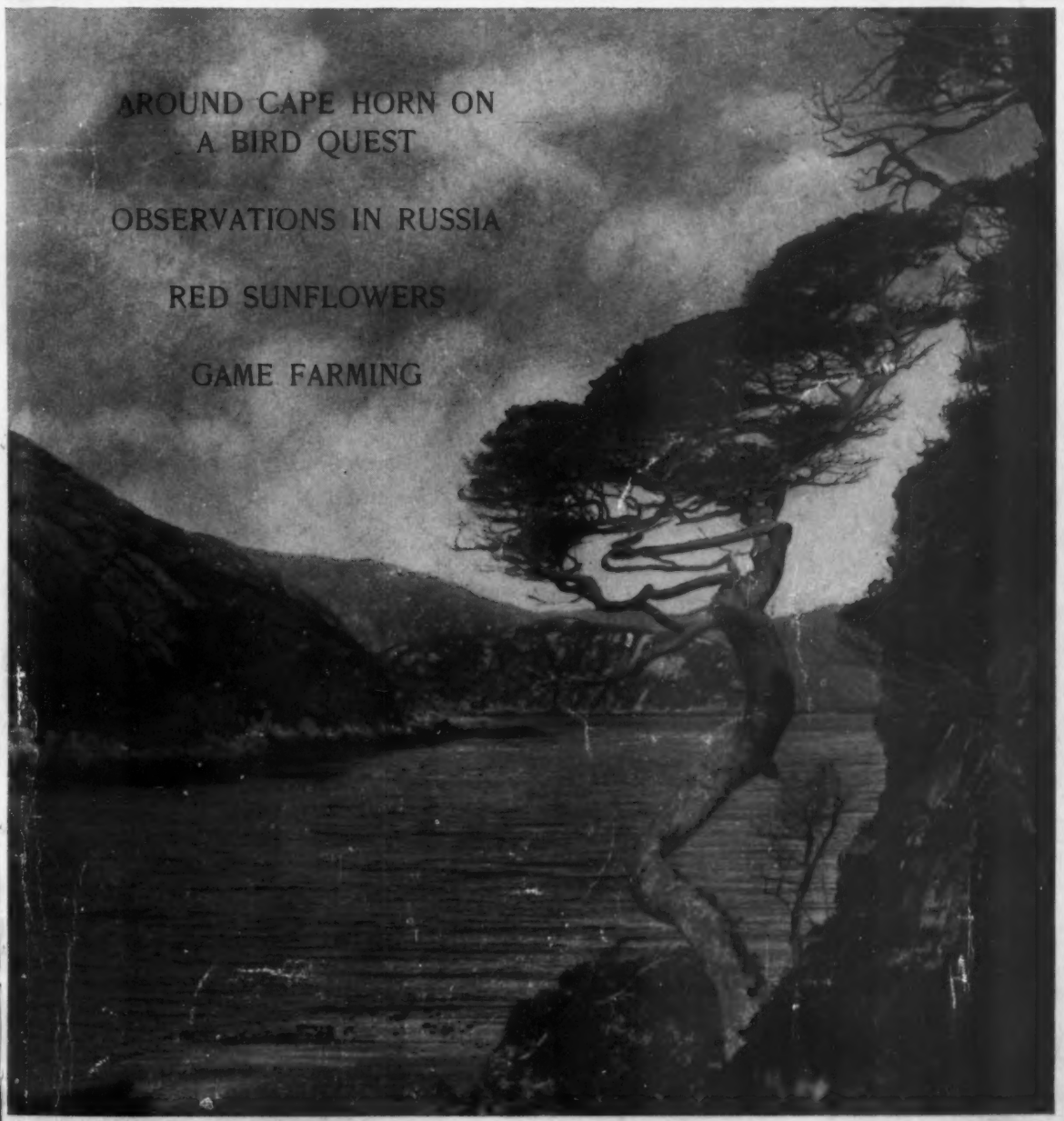

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MR. ROLLO H. BECK

Wide experience and much practical knowledge, coupled with a boundless enthusiasm for the work, have made Mr. Beck one of the most successful bird collectors in a region where such collecting is accomplished only with the greatest difficulty and even danger. Through his efforts on the Brewster-Sanford Expedition to South America, there is now deposited in the American Museum the most complete representation of Tubinares in the world

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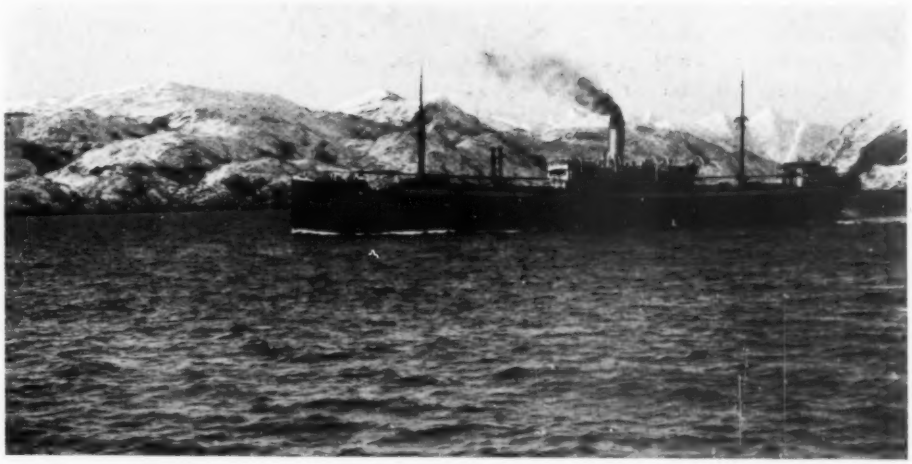


During the winter season, traveling through Smyth's Channel, which extends from the Strait of Magellan along the southern coast of Chile, one sees an ever shifting panorama of distant peaks and white-garbed islands, with snow-encased fjords leading off to one knows not where

Narrative of a Bird Quest in the Vicinity of Cape Horn[1]

By ROLLO H. BECK

WHEN we were leaving San Francisco, California, in December, 1912, for a two years' collecting trip along the coasts of South America, rounding Cape Horn was regarded as a rather remote possibility; but in December, 1914, when we enjoyed our Christmas dinner only thirty miles from Cape Horn, the same possibility loomed large before us. The disturbance in Europe contributed in no small measure to our passing the summer months in and about the region so dreaded by sailors—for our plans had been laid to visit the Falkland Islands that season.

Perturbed conditions, evident before we attempted to land from the steamer in the Falklands, and which were later settled in the Falkland Island battle, made us decide to try Cape Horn for a time. I had journeyed down along the west coast through Smyth's Channel and other inland waters, and up through the Strait of Magellan in the dead of winter, passing the months of September and October at Mar del Plata, at the mouth of the Rio Plate, collecting ocean birds while waiting for the summer time to strike the southern latitudes. By the middle of November, when Punta Arenas had begun to put

[1] Article and illustrations copyrighted, 1918, by Rollo H. Beck

on spring garments, I readily obtained the best sealing cutter Magellan Strait boasted, as the war had made sealing unprofitable. This was a small twelve-ton boat manned by three men and a cook. It had a small cabin that accommodated the collector and his wife, while the four sailors bunked forward close by the stove, which was fed with wood chopped as we went along. Having been accustomed to drying wood thoroughly in California before burning it, I imagined we should need coal about Cape Horn where rain or snow thoroughly soaks all wood lying on the ground. The captain, however, took but a sack or two for emergencies, relying on freshly chopped wood most of the time, and I was greatly surprised to see how readily the newly felled trees burned.

We left Punta Arenas on November 25, and were not two hours out before a great flock of birds was sighted, fishing in the middle of the strait. We changed our course and ran out to them, but found they were dominican gulls rather than the hoped for shearwaters. It was the largest flock of gulls I had ever seen, containing several thousand birds, and resembled at a distance the great hordes of sooty shearwaters that are seen at Monterey, California, in the summer and fall. Swinging back on our course again, we headed for Point Isidro some fifty miles down the strait, reaching it about four o'clock, and anchored for the night. An old Norwegian, whom we dubbed "Quién sabe" owing to his frequent repetition of that questioning phrase, was the sole warder of the defunct whaling station located in the cove. In former years whaling from this point had been a profitable occupation, many whales being taken in Magellan Strait. But they have become scarce lately, and in our two months' trip only three whales were seen, these being in Beagle Channel a short distance south of the strait. We anticipated a couple of hours of rough weather crossing the strait, as the prevailing westerly winds sweep strongly up the channel from the western entrance to near Point Isidro where the strait bends northward. We enjoyed good weather, however, and after crossing, worked with a light wind and the tide as far as King Island in Cockburn Channel. The close view of Mount Sarmiento, the snow-covered peak visible in clear weather from Punta Arenas, was enjoyed for hours as we passed it, the usual foggy covering being absent in the morning.

After spending a day at King Island until a head wind subsided, we started out again and succeeded in getting into the protected waters just beyond Brecknock Pass. This was a dreaded spot, for the ocean swells roll up into the channel, and some years before, the captain had been capsized here and all his companions drowned, a sudden squall overturning their boat. We anchored in a small harbor in the lee of London Island, working close in to the edge of a kelp patch so that the sudden williwaws or gusty gales sweeping down off the rocky heights could not disturb us. Several diving petrels came into the bay from the sound during the afternoon and I obtained a number, shooting the most of them during a thick snowstorm that raged for an hour. These little birds, though belonging to the petrel family, resemble in their forms, flight, and feeding habits the northern auklets rather than any of the other petrels, and I was interested to find in Peru a closely related species unable to fly while molting the wing feathers, being in that particular also like the auklets. Going ashore at London Island and climbing over the granite rocks toward the south, a pretty lake was discovered lying in a small valley, and as we were walking along the shore, one of the brown-breasted plovers that had been so common the preceding winter at Ancud, a

LAUNCHING FISHING BOATS AT MAR DEL PLATA, ARGENTINA

An interesting sight in summer at Mar del Plata is the daily launching of the fishing boats. On account of the shallow water along the coast, it is unsafe to leave the boats anchored in the bay, and all are taken ashore at night, being hauled up on the beach by horses and returned to the water in the same way in the morning

thousand or more miles to the northward, suddenly fluttered into view, revealing a handsome set of eggs tucked away under a tuft of short grass. Birds were very scarce; occasionally a small flycatcher would be seen or heard, or a robin would make known his whereabouts, and in the stunted trees that found shelter in little pockets or on the lee side of towering cliffs, the tiny creepers could be heard. While the barren rocks brought to mind similar spots in the Aleutian Islands of Alaska, the cheery song of the snowflake or *Leucosticte* found no counterpart here.

The eggs of the kelp goose, usually five or six in number, are, as a rule, stowed away in a clump of grass close to the beach. (Note the nest at the feet of the feminine figure.) This goose lives largely on bits of kelp and other salt water vegetation and is eaten only by the Indians. It is much tamer than the upland goose, a few of which are also found on the larger southern islands. A close view of the nest is shown on the opposite page

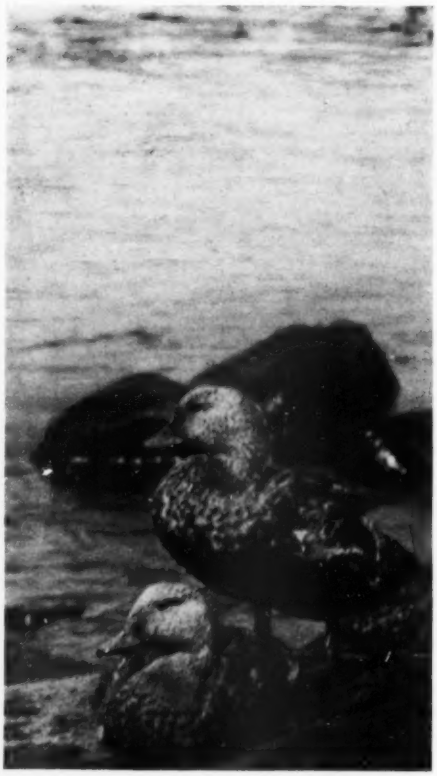
Leaving this inhospitable anchorage the morning of December 2, we sailed out into Whaleboat Sound with a fair wind, and through rain and snow squalls reached the eastern end of Grand Island where we anchored again. The next morning at half past five we got under way and spent the forenoon sailing slowly along until an inviting cove at Timbales Island, with a snowy white kelp goose standing on the outermost point of rocks, induced us again to drop anchor and go ashore. This part of the sound was studded with little islands where the presence of steamer ducks and kelp geese gave promise of nests, although two or three pairs of each were seen with broods of downy young. Shortly before anchoring, we saw the wreck of an Argentine steamer, the captain of which had selected the wrong channel between two of the numerous islands and had come to grief on an uncharted reef. Timbales Island interested us greatly, and we obtained fine sets of eggs and photographs of both kelp geese and steamer ducks. The sailors discovered the goose's nest a couple of miles from the

One of the land birds of the Cape Horn region is a small, dark-colored, wrenlike whistler, called by the natives *patra* in imitation of its note. Although it is heard constantly along the bushy shores, the bird seldom is visible. A single nest was discovered on London Island, and Mrs. Beck may be seen taking a peek at its contents

ship. Before getting back to the vessel we had to endure a soaking rain for an hour, but we had learned to carry our rain coats with us when intending to remain away from the boat for any length of time, so we suffered little

When the eggs of the kelp goose are first laid, little down is in evidence in the nest, but gradually more and more is plucked by the sitting bird from her breast until finally, when the eggs are hatched and the young geese leave the nest, a great wad of soft feathers remains to be blown away by the wind

from rain squalls. After leaving Timbales Island we sailed nearly south for twenty-five miles and swung around into Christmas Sound, an island-dotted channel which separates Hoste Island from several small islands bordering the southern ocean. We anchored for the night halfway down the sound, and when we sailed again a day later, we headed for Ildefonso Island which lies about twenty miles out in the open ocean to the southward. After getting outside the sound four or five miles, the breeze began to increase, and the captain turned back to anchor in a secluded cove in Trefius Bay, which forms the southern entrance to Christmas Sound.



Steamer ducks are often surprised asleep on some jutting rock in the quiet channels of south Chilean waters

Ildefonso Island has no anchorage, being merely a long narrow rock sticking up a few hundred feet above the water, and as its shore line is swept continually by the heavy seas that roll up from the westward, landing is possible only on calm days, and these are of rare occurrence. The island was plainly visible from Trefius Bay, but although we anchored on the seventh, it was not until the seventeenth that the rain and snow squalls gave place to a sunny day. While awaiting the good weather, we rowed about among the islets in the bay. On one a flock of kelp geese was stopping while they molted their wing feathers. It was a mixed flock of males and females, and I noted that while these nonbreeding birds were unable to fly, several pairs of adult geese with young could fly. A couple of weeks later, near Cape Horn we saw another small flock of geese molting, but on the entire

The nest of the steamer duck is cleverly hidden under a stump or dense bush a few yards back from the beach, and the newly hatched young follow their parents into the cold waters of the sound, seemingly indifferent to temperature changes

trip of two months I do not remember seeing any adults, while accompanied by young, which could not fly when pressed. On one of the small islets we found a skua's nest with two eggs ready to hatch. The nest was on the open, grassy top, entirely exposed to the driving hail storms that swept over at frequent intervals night and day, but the birds, being clothed with coarse heavy feathers, seemed not to mind. When we first reached the ocean side of the islands the beautiful slender-billed fulmars were common, but by the time we had left Ildefonso Island behind us the fulmars had passed to the southward toward their breeding grounds in the South Shetlands, several hundred miles south of Cape Horn.

A strange feature of the landscape at the eastern end of Caroline Island, where we were anchored, was the tufts of earth sticking up on the lee sides of the great granite boulders. The wind, sweeping across the island, strikes a moss-covered rock, and perhaps, in some extra heavy gale, loosens the tightly clinging moss at one edge. Succeeding winds tear away bits of the decayed roots and soil which have gathered, until finally the rock is exposed, and then it is merely a matter of time until the windward face of the rock is swept clean. But on the leeward side of large rocks the wind has much less force, and the roots hold the matter together so firmly that a soft piece of vegetation and earth will be sticking up, while surrounding it is a solid barren rock.

The weather looked clearing on the sixteenth and at half past one on the morning of the seventeenth, as the sky began to lighten, we towed out into the open sea again. A dead calm prevailed until noon, but at nine o'clock I put out in the boat and rowed along the eastern shore of the bay where Hoste Island juts out in high perpendicular cliffs. Hundreds of the white-breasted king shags were nesting on the ledges, with pendant-like bunches of tussac grass hanging from their nests, and on a small unclimbable rock near them I saw my first colony of the handsome red-billed, bluish-colored Scoresby gulls nesting. A light breeze sprang up at noon and we stood out toward Ildefonso where I hoped to find the yellow-nosed albatross nesting. That was the particular desideratum of our trip. In Punta Arenas the captain had assured me Diego Ramirez Island, seventy-five miles to the southward, where the birds were supposed to nest, could be reached in our small boat, but after seeing the sudden storms that sprang up without an hour's warning, we decided Ildefonso was quite far enough from shelter to satisfy us, and he thought it probable some of the birds nested there. Our light breeze died down toward evening and we stood back in the direction of land, heading out again at midnight.

At three in the morning the captain roused me out in foggy, drizzly weather, announcing the nearness of land. As he expected a change in the wind he wanted me to hasten ashore, but I held off until five o'clock when, with camera loaded, three of us dropped the whaleboat overboard and pulled in along the rocks. Being oldtime sealers, the two sailors carried rifles, expecting to find fur seals on the rocks. We did see a dozen or so at the entrance to a cave and shot a couple, but the expected herd was not there. Black-browed albatrosses by the dozen sat on the steep sides and on top of the island, or sailed over us, some alighting on the water and others sweeping over and then back again to their nests. We rowed a mile or two until a little ledge gave us a footing to climb the slippery penguin trail to where some of the albatrosses were nesting. The nests, containing newly hatched young, were built up of mud picked up near at hand, and reminded me at once of flamingo nests. Close by and under the albatross nests rockhopper and jackass penguins had nests with half-grown young, and I was busy with the cameras for an

CHRISTMAS SOUND, ONE HUNDRED AND TWENTY MILES FROM CAPE HORN

A climb of a thousand feet in the vicinity of southern Chile spreads before one a waste of waters dotted with rugged wind-swept islands, against a background of desolate snow-capped mountains. Hoste Island lies at the left. In the distance, Christmas Sound leads through Talbot Passage into the Antarctic

ALBATROSS NESTS ON ILDEFONSO ISLAND

The black-browed albatross builds nests elevated several inches above the ground, thereby making it possible to keep the occupants spotlessly clean, which would not be the case were the nests placed in hollows after the manner of albatross nests in tropical islands. The birds are very tame, usually remaining on the nests until forcibly removed

PENGUIN TRAILS

Where the penguins have traveled back and forth from the water to the rookery generation after generation for long passages of time, marks of their claws may be seen on the steep face of the rock among the lines caused by natural erosion

YAHGAN INDIAN CAMP

A slender wisp of smoke led us to this camp around the point of an island in Beagle Channel. Although a heavy rain had been falling for hours, a cheerful fire was burning inside the wigwam, and in a five-gallon can over the fire several young shags were cooking for breakfast. We saw many deserted camp sites; this was the only occupied one observed in two months' traveling through the southern channels

hour or two, tramping through the mud and slush searching for the best spots from which to photograph them. It was a surprise to see and hear several creepers in ragged plumage in the long tussac grass, as not a bush or tree was in sight, and they are birds of the forest rather than of the open. Perhaps an abundance of flies about the rookeries attracts them. A drizzly fog hanging low over the island gave promise of a change in wind, and after taking photographs and deciding that the yellow-nosed albatrosses were not present, we returned to the sloop which was standing on and off near shore.

We ran back toward Hoste Island, passing in between Morton and Henderson islands and close to a little island where a copper mine had been worked some years before, then up through a tortuous channel, finally anchoring under the Diadem Mountain, which stretches up about three thousand feet. Mrs. Beck and I climbed the mountain-side from the thick grass and mossy tundra along the beach, to a small lake where great cakes of ice were floating in the cold water. This was probably two thousand feet up and was surrounded by snow-covered mountains. A flock of dominican gulls was standing on a snow-covered islet in the lake, and some were bathing in the icy water. The overflow water from the lake poured down a rocky cascade and went tumbling over high falls to join the salt water below. Pretty white verbena-like flowers were blossoming on the steep hillside and adding their bit to make the climb quite worth while.

The next day, soon after lunch, we were surprised to see a small sailboat appear around a headland, and as it approached, our cook recognized the steersman as a former friend from Ushuaia. The sloop contained but two individuals, the young man acting as captain and an Indian boy as helper. They had three dogs with them and about fifty otter skins which they were taking to Punta Arenas to sell. After making some inquiries about the course and telling us they intended to try for fur seals on an outer rock some miles south, they vanished around a point—and have never been heard from since. We made particular inquiries six months later in Ushuaia and Punta Arenas, but their foolhardiness had undoubtedly brought its certain reward.

We moved a few miles down toward False Cape Horn the next day and from a rocky point where a colony of terns was nesting we secured a bucketful of eggs to eat. December 22 began with a light breeze and, as False Cape Horn was only twenty-five miles away, we hoisted anchor at four in the morning and headed for it. Getting away from the protection of the small islands, we could see the dark heavy clouds piling up over the top of Hoste Island behind us. This was a sure presage of storm, but our breeze freshening, we hoped to get around the cape before it struck us. Just before reaching the cape a rain squall hit us and with it wind. The sea roughened suddenly, and as we ran before the squall the boom hammered the waves as they swept past. Fortunately we were a few miles to windward, and it took but a short time to swing round the cape and haul up on the lee side where the fine anchorage at Lort Bay protected us from the bad weather. Christmas day began sunnily, and we went ashore for a couple of hours to where an old Indian rancho, as the wigwam frames are called, was standing as a reminder of a fast vanishing race. Wild celery grew in abundance about the site, and mussel shells showed through the rank vegetation growing everywhere. We left on the twenty-sixth for Hermite Island from which we expected to round the Horn. Anchoring at the east end and spending a couple of days there, we took pictures of Cape Horn from the top of Hermite Island in case our attempt at rounding the Horn proved futile.

This article will be concluded in the next issue of the JOURNAL.

SCENES FROM THE VICINITY OF CAPE HORN[1]

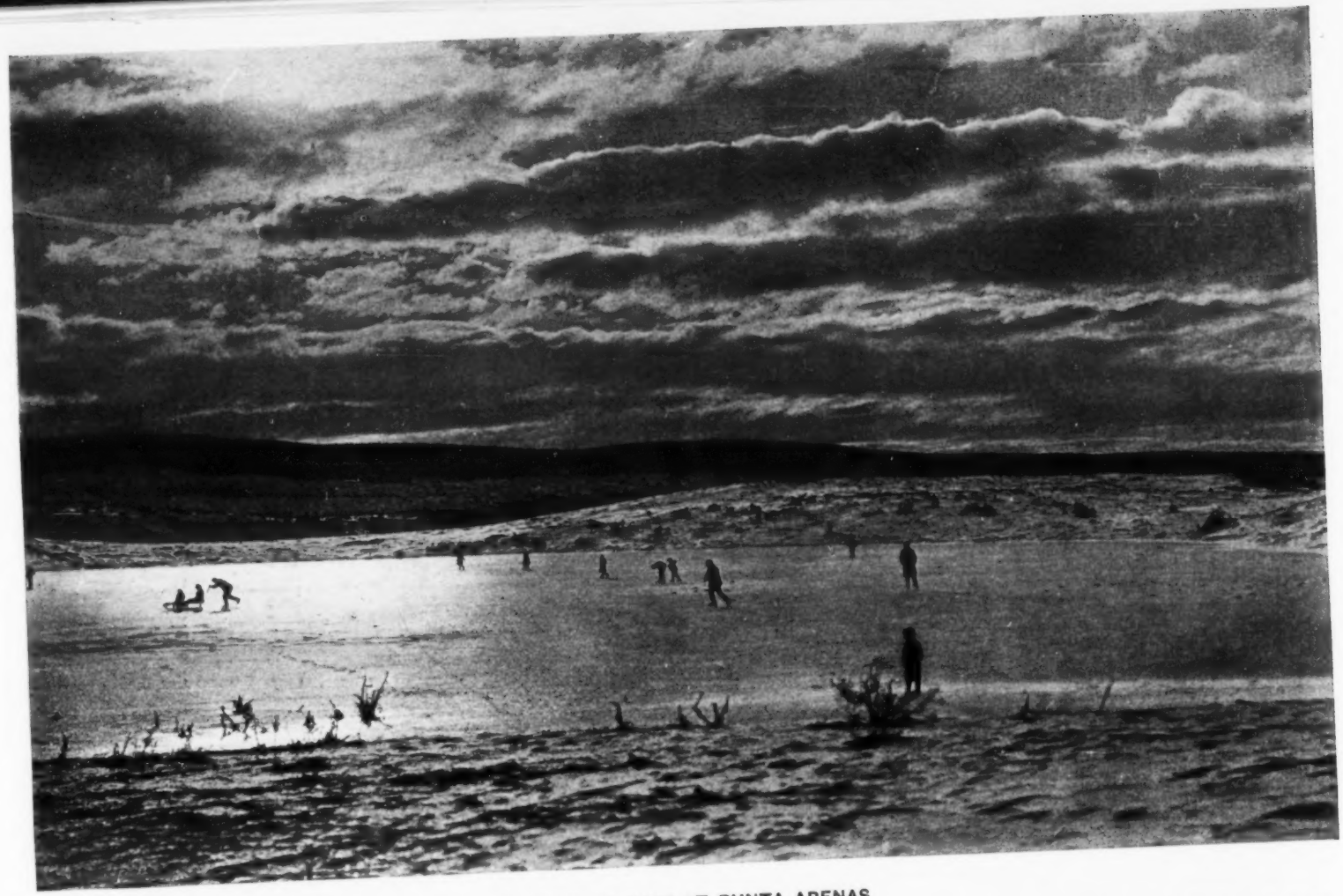
BY ROLLO H. BECK

Duotones from photographs taken on the Brewster-Sanford Expedition for the study of pelagic species of birds in the southern Pacific. The expedition remained one year in the Cape Horn region and visited remote islands where albatrosses, fulmars, shearwaters, and petrels, deserting their home on the open sea, resort to the land to nest

BEACHING FISHING BOATS AT MAR DEL PLATA, ARGENTINA

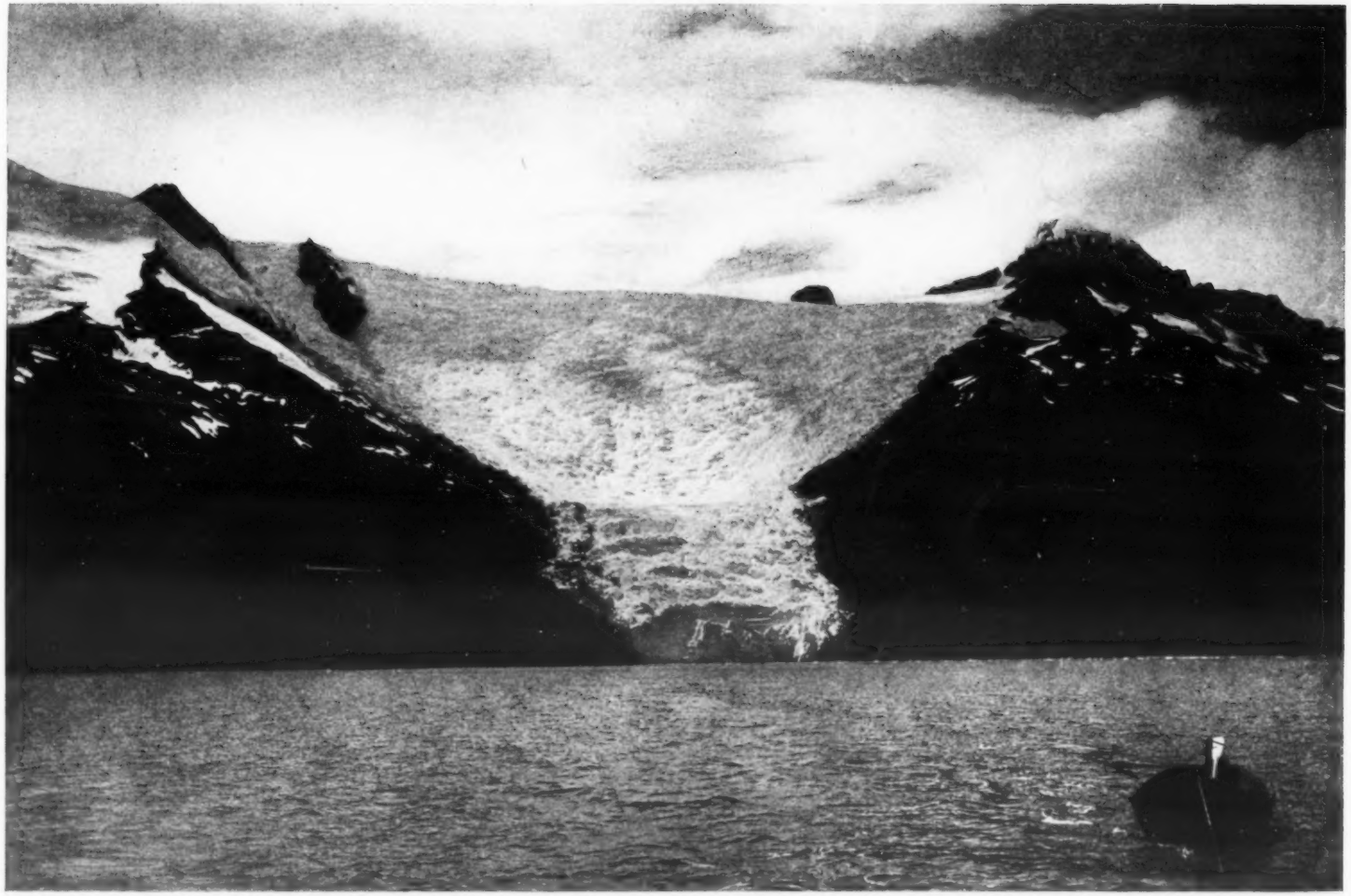
When the fishing boats return with the day's catch, they come into port at full speed and drive up on the beach as far as possible. They are then drawn still farther out of the water by horses that pull sideways with a saddle instead of straight ahead with a collar as is customary elsewhere in the world

[1] Illustrations and text, together with the preceding article, copyrighted, 1918, by Rollo H. Beck



SKATING IN JULY AT PUNTA ARENAS

While many of the inhabitants of New York are seeking cool spots on mountain tops or roof gardens, dwellers in Punta Arenas, the most southern town in the world, are enjoying the short afternoons skating over the smooth ice which covers the pond on the town common



A BEAGLE CHANNEL GLACIER

There are several glaciers to be seen during the trip through Beagle Channel. While not so large as some of the glaciers in southern Alaska, they are perhaps more attractive on that account. The rock-bound cañons down which the glaciers flow are at times devoid of vegetation and present a scene of utter desolation. Clouds floating along from the westward over the higher peaks are forerunners of a squall which usually follows sunny weather

DOMINICAN GULLS IN THE STRAIT OF MAGELLAN

This great flock containing thousands of gulls was seen fishing in the Strait of Magellan November 22, 1914. While one sometimes sees a few hundred gulls about the wharves and steamers in American harbors, flocks of this size are extremely rare anywhere

FIFTY MILES WEST OF CAPE HORN

The rugged nature of the islands bordering on the southern ocean may be seen in this view of Caroline Island. The bushy-topped trees with barren trunks are characteristic of these storm-swept regions, where all forms of life have a never ceasing struggle for existence

VIEW OF CAPE HORN FROM HERMITE ISLAND

On account of its configuration, Cape Horn looks very much the same whether viewed from the east or from the west. The photograph here given, taken on a clear day, gives a view from Hermite Island, fifteen miles northwest of Horn Island. The cape is on Horn Island partly hidden in the far center background. Chanticleer Island is seen on the right, while Hall Island is the island at the left which conceals the major part of Horn Island

AT HOME ON THE BOSOM OF THE DEEP

The Cape pigeon of the Southern Hemisphere is as well known to seafarers as is the wandering albatross. From Buenos Aires or Valparaiso to Cape Horn the Cape pigeon in winter time nearly always is present astern of a vessel. This one is just leaving the water to resume its tireless flight. These birds do not nest about Cape Horn, but go farther south into the colder regions of the Antarctic to rear their young

SELKIRK'S CAVE ON THE ISLAND OF JUAN FERNANDEZ

Four hundred miles off the southern coast of Chile lies the island on which a Scotchman, Alexander Selkirk, passed four years of solitary existence. It is six by eighteen miles in extent, of about three thousand feet elevation, steep, and generally desolate in appearance. At the highest point, known as Selkirk's Lookout, a bronze tablet commemorating Selkirk's sojourn there has been erected. Although it was doubtless this adventure of the mariner Selkirk which inspired De Foe's tale of "Robinson Crusoe," the original title of the story, which on account of its length is abridged in modern reprints, indicates that Crusoe's island was not in the Pacific, but on the northern coast of South America, near the mouth of the Orinoco River

Indian Corn as a World Food[1]

By CLARK WISSLER

FOOD and fuel are the two subjects uppermost in the public mind. Starvation and privation have not come within the experience of the people of the United States except as individual or local calamities. In fact, we have come to look upon famines as primitive phenomena, due to improvident and undirected social activities. Thus, when we read that whole tribes of Eskimo perish from food shortage we shrug our shoulders and say that this is due to their low state of culture, a form of existence that takes no thought of tomorrow. Yet, the facts are that the Eskimo has worked out a scheme of life that under normal conditions provides him with plenty and comfort at all seasons of the year: it is only when his group gets too large for the resources of the country in which he lives that calamities come. But such disasters are not peculiar to the Eskimo; the literature of the American native, north and south, furnishes many examples of what may be formulated as a principle, that is, when a people work out a method of supporting themselves in a given locality, they tend to increase in numbers until a point is reached where the demand is greater than the supply. Whenever this point is reached, only the most drastic efforts can prevent a calamity.

The fuel and food shortage which now confronts us is a warning that our rapidly expanding population and the massing of families in great manufacturing and trade centers are reaching a point where the long established methods of food production and distribution will no longer suffice. The pages of history and anthropological literature show us exactly what will happen if we do not

Hidatsa digging stick, rake, and hoe, the first a heavy ash pole hardened and sharpened by fire, and the rake a deer antler, or willow shoots cleverly bent at the ends to form teeth

[1] The illustrations accompanying this article are from *Corn Among the Indians of the Upper Missouri* by George F. Will and George E. Hyde, published by the William Harvey Miner Co., Inc., St. Louis, 1917. Mr. Will is energetically propagating many varieties of Indian corn with a view to their introduction into the higher latitudes of the United States and Canada. Samples of the varieties of corn shown here, together with native farming tools, are on exhibition in the Plains Indian hall

at once set in motion the social machinery to meet the new conditions of the future. In short, food shortage and ultimate famine are not the characteristics of primitive life, but the results of natural laws governing the history of all social groups, high or low.

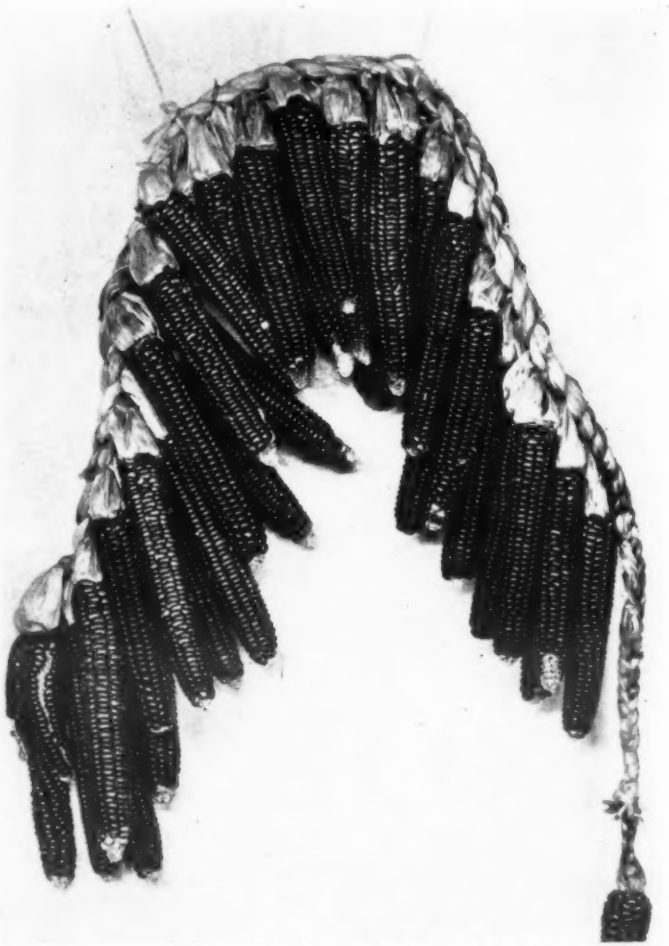
It has been suggested that we rely more and more upon cultivated food plants. One cannot help applauding the spirit with which our people rallied to the fields and gardens last spring to do each his mite in increasing our dwindling surplus. But there is also another direction in which great gains can be made. When Columbus found America he discovered some new foods destined to take the most important places in the dietary of the world. I say discovered, but in reality, he plagiarized or simply appropriated them, for the discoveries had been made by the ancestors of the American Indians many centuries before Columbus was born. When we are reminded that more than thirty of the world's important food plants were already in cultivation here in 1492, we can form some realization of our cultural obligations to the aboriginal American race. Of these foods none take so high a place as Indian corn. In addition to being one of the best of the world's foods, it is the one cultivated plant that seems most at home in our country. It is the greatest cultural triumph of the American race and its origination makes a strong claim to the highest place in the world's great deeds of culture.

It is therefore most timely that there are now appearing some excellent books upon this important plant. Among these books is one deserving especial mention, *Corn Among the Indians of the Upper Missouri*, which reviews the early writings upon the subject and gives some account of the known varieties of corn cultivated by the Indians in North and South Dakota. In the main, this book deals with one tribe, the Mandan.

The Indian tribes of both South and North America cultivated corn in about every region where it could be raised by their methods. In other words, corn occupied about as large a place in the culture of the Indians as it does in our own. Long before the day of Christopher Columbus some Indian genius began to tame the wild ancestor of maize, a process which was carried ultimately to such a pass that there is still some doubt as to the identity of the parent plant. Virtually all the known varieties of corn also had been developed before 1492. In fact, as corn is cultivated today on our farms, the methods used are essentially the same as those devised by the untutored Indians of prehistoric days. It behooves us then, we who have so thoroughly and grossly assimilated this great cultural corn-complex, greatly to intensify and improve upon it, that it may take its place in the great super-complex of culture traits that must be evolved if our expanding population is to survive.

The problem that confronts us is as old as man: can we devise new methods of feeding, clothing, and warming ourselves that are workable on the scale required by our ever increasing population? It is plain that when Columbus landed on these shores many parts of the continent were supporting as many Indians as could be maintained in a seminomadic form of culture. In other words, the aborigine had about reached the limit of expansion until he devised new ways of living, for the inexorable law of supply and demand checked his growth—if too many people came into existence, there was a famine. Although we live under far different conditions and on a widely divergent plane from that of the Indian, we must give some consideration to the teachings of culture history: that is, there will come a time when the present methods of food production and distribution will be inadequate.

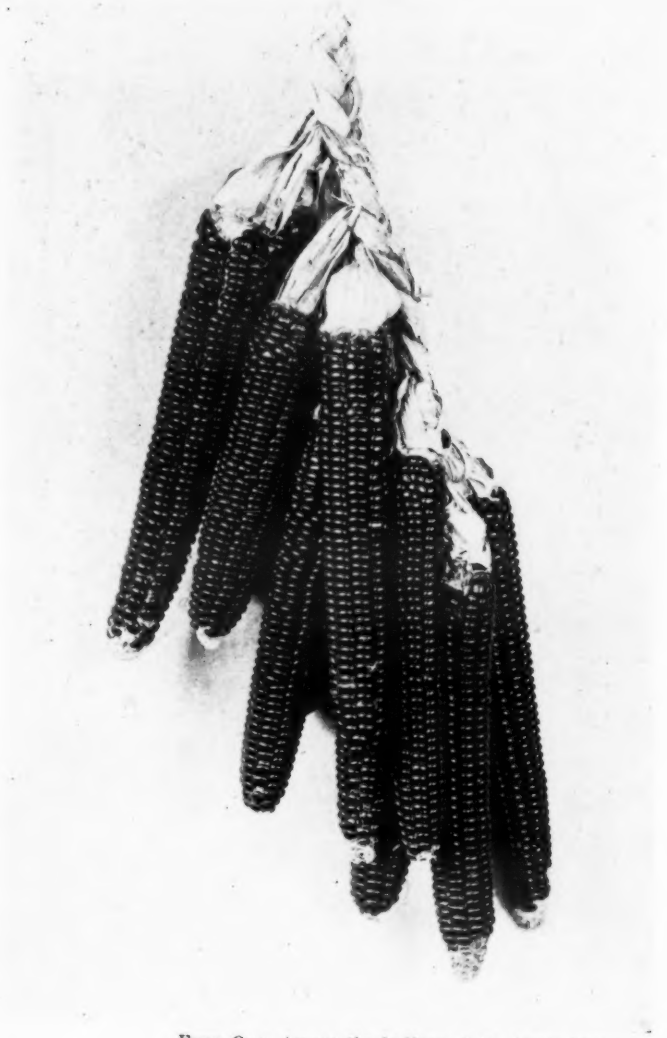
From *Corn Among the Indians of the Upper Missouri*



From *Corn Among the Indians of the Upper Missouri*

SOFT WHITE AND SOFT RED CORN OF THE MANDANS

The ripe corn harvest, which took place early in October with the Upper Missouri tribes, lasted about ten days, during which time the ears were gathered, thrown into piles, and husked by the women and young men. Then the large ears were braided in the field by the women, fifty-four or fifty-five ears to each braid. These ropes of corn—one of which in trade was reckoned as the equivalent of a tanned buffalo robe—were hung on scaffolds to dry, their variegated hues lending a festive appearance to the village



From *Corn Among the Indians of the Upper Missouri*

From *Corn Among the Indians of the Upper Missouri*

MANDAN BLACK AND MANDAN BLUE CORN

Upper Missouri Indian corn is bushy in appearance, the ears —from eight to ten inches long—often emerging from the ground on a short stalk. It is hardy, adapting itself to varying conditions of moisture and drought, as well as to frosts. The period from planting to maturity is about sixty days in favorable years, and seldom more than seventy days. White, yellow, red, black, blue, and spotted varieties occur. By breeding and crossing these native species it is hoped that hardier and heavier yielding varieties for the Northwest may be produced in abundance

From *Corn Among the Indians of the Upper Missouri*

From *Corn Among the Indians of the Upper Missouri*

MANDAN BLUE AND WHITE SPOTTED AND SOFT YELLOW CORN

Early settlers in America were glad to take the Indian's native food product, maize, and to learn from him the methods of growing and handling the crop. They did not, however, always realize that each new region occupied presented different conditions of soil and climate, which must be met by a study of the ways and means used by those who had been growing corn in that particular section often for three hundred years and had learned from hard experience what varieties to plant. These are two of the thirteen varieties said to have been grown by the Mandans in early times in the Upper Missouri area

ONE OF THE MOST BEAUTIFUL CHURCHES IN THE KREMLIN AT MOSCOW

The chief interest of Moscow is centered in the Kremlin, both for its historical associations and for its churches with their semibarbaric splendor and curious architecture. In one of these churches all the Russian monarchs since Ivan IV have been crowned, in another they have been buried. The dusky interiors are adorned with numerous icons of great antiquity, covered with gems and precious metals. The great Russian Church has reformed and liberalized itself since the Revolution without losing its fervent religious faith and sense of national solidarity

The women's battalion, Petrograd.—These women soldiers fought gallantly for their country last summer at many points on the battle front

Public Health Problems in Russia

By C.-E. A. WINSLOW

Curator of Public Health, American Museum of Natural History; Professor of Public Health, Yale University; Member of American Red Cross Mission to Russia

THE American Red Cross Mission to Russia (Dr. Frank Billings of Chicago, Chairman) left the United States at the end of June to offer aid, on behalf of the American people, in the military and civilian relief problems of our Russian allies. The trip was made by Canadian Pacific steamer to Yokohama, across Japan by rail, from Tsuruga to Vladivostock by Russian Volunteer Fleet steamer, and across the Trans-Siberian Railroad by the one-time Imperial train, which had brought the Root party out and was held for our accommodation. The dining car on this train was the one in which the Czar handed his abdication to the representatives of the Russian people, four months before.

We found Siberia a beautiful country and potentially a rich and prosperous one, a larger edition of our own Northwest. Russia as a whole was surprisingly peaceful and orderly, considering the crisis through which it was passing. Police power had virtually ceased to exist since the Revolution, yet I did not hear anywhere so much as a voice raised in anger. Bread lines, meat lines, milk lines, tobacco lines, calico lines, were to be seen on almost every street, and in some of them the people slept all night upon the doorsteps or the pavement in order to hold their places for the morning; but I saw nowhere anything but patience and courtesy, no single attempt to push ahead and gain an unfair advantage.

The lack of bitterness or wanton damage with which the Revolution was consummated struck us as another evidence of the self-control and common sense of the Russian people. The jails and the secret service archives had been burnt but otherwise Petrograd and Moscow were unharmed. Great Catherine's statue on the Nevski had been hallowed to new uses by the simple process of thrusting the red flag of the Revolution into her hand alongside the imperial scepter; and in the palaces, now used for government bureaus, the pictures of the late royal family were covered neatly with brown paper.

Illustrations from photographs by the Author

Political control, while we were in Petrograd, was in the hands of the last Kerensky cabinet, which was socialist, as three fourths of Russia is socialist, but which stood for a gradual working out of the socialistic program and for a vigorous prosecution of the war. The Cadet party, which includes such men as Miliukoff, Lvoff, and others to whom we have looked in the past as leaders of liberal Russia, was the chief opposition party, demanding a sterner discipline than Kerensky deemed attainable, and aiming at securing the fruit of the political revolution with as little disturbance of the social order as possible. On the other side, criticizing the Kerensky *régime* from a precisely opposite standpoint, as despotic and bourgeois, was the then smaller minority of the Bolsheviki.

Russia had passed through three years of terrific military strain. She had had two million men killed and four million sick and wounded, while two million and a half more were prisoners in the hands of the Central Powers. Yet she was maintaining an army of three million on the front last summer.

The medical care of the army was in the hands of four great relief organizations, the Sanitary Department of the Army, the Russian Red Cross, the Union of Zemstvos, and the Union of Towns. We found these organizations provided with admirable factories and large storehouses in Petrograd and Moscow, and the hospitals and system of handling the wounded at the front and behind were, in the main, worthy of high praise. The gigantic scope of the work is indicated by the fact that 200,000 hospital beds had been provided for the care of sick and wounded Russian soldiers. The technical staff, both surgical and sanitary, was of high grade, and supplies were in general adequate. Some things, however, were lacking and could not be obtained in Russia,—motor ambulances, certain serums and vaccines, certain drugs, rubber goods and the like. Our first duty seemed to be to supply these specific needs; and at our request the four organizations named above formed a joint

Typical group of Russian soldiers at a Siberian railroad station.—It is these peasant soldiers, ten million strong, who will determine the ultimate future of Russia

committee to meet with our representatives and prepare specifications of the articles most urgently needed. An American Red Cross bureau was established in Petrograd with a storehouse in Moscow to deal with these needs as they should arise; and the first shipment of supplies under this plan left America in August last.

On the civilian side, we found excellent departments of health in the larger cities, with laboratories and statistical bureaus of the most approved type and good organizations for the control of communicable diseases. Antituberculosis work is not, however, developed as in England and America, and systematic public health education along modern lines has scarcely been begun.

Statue of Great Catherine, on the Nevski, with the red flag of the Revolution placed in her hand alongside the imperial scepter

The greatest health problem of Russia is infant mortality. The death rate among young children is enormous, both in city and country, one baby out of every four dying in the first year of life (as compared with one in ten in New York City). The rates are highest in those provinces with the purest Russian population. It is not the lack of breast feeding which is at fault but the almost universal habit of giving the baby all sorts of other foods as well. The remedy, as everywhere, is education of the mother in the principles of infant care, and in the large cities excellent beginnings have been made along this line. I have never seen anything finer than the Infant Welfare Station at the Morosov Hospital in Moscow or the Museum of the Patronage for Motherhood and Childhood at Petrograd. After the war, however, the work now being done must be multiplied a hundredfold.

The most interesting feature of public health work in Russia is the system of Zemstvo medicine which has brought the blessings of medical care to a large proportion of the people throughout the vast areas of the scattered rural population. The representative rural assemblies have recognized the medical care of the peasant population as a fundamental duty of the state, and have provided in most of the provinces of European Russia medical districts with small hospitals (from 4 to 20 beds) which furnish free medical care to all who come. There are, of course, even now far too few physicians to care adequately for the rural population; but when it is remembered that before the Zemstvos began their work the peasant never saw a qualified physi-

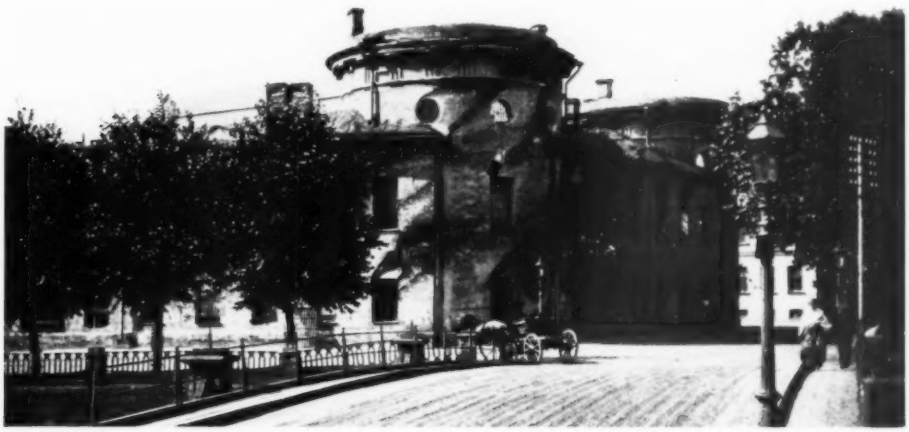
Typical Siberian house and peasant cart.—Siberia is a larger edition of our own Northwest, and is a beautiful and potentially prosperous country. We found Russia as a whole surprisingly peaceful and orderly in view of existing conditions

Milk line outside the market in Petrograd.—Milk is particularly needed in Petrograd, the total supply being only about one tenth of the amount actually required. People sometimes sleep all night on the pavement in order to hold their places in line

This palace was the home of a famous dancer before the Revolution, and later the headquarters of Lenine, leader of the Bolsheviki

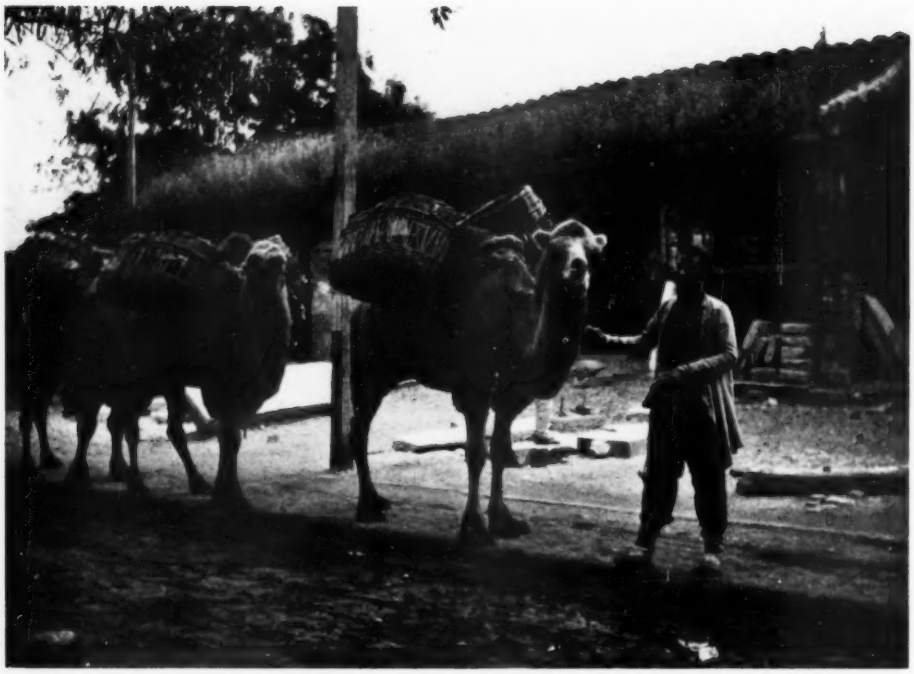
cian except at some official investigation, the supply of even one physician to every 23,000 population seems a remarkable achievement.

It is curious to note that while with us public health officials after establishing the organization of purely preventive and sanitary work are beginning to expand along more medical lines in the direction of school clinics, infant welfare clinics, tuberculosis clinics, and the like, the course of historical development has been precisely the opposite in Russia. There, the socialization of medicine came first and the Zemstvo organizations, originally created for medical care, are now, in the more progressive provinces, expanding along



A Petrograd prison which was burned and gutted during the Revolution.—Except to the prisons and the secret archives, almost no damage was done in this remarkable awakening of the people

Group of Mongolian cowboys in Manchuria.—The costume and the pose of the Asiatic "bad men" strikingly recall old days on our Western Plains, except for the fact that some of these horsemen have queues as thick as one's arm



Camels in Peking, where members of the American Mission spent a few days on the return trip

Flood in the streets of Tientsin.—Members of the Mission stopped at Tientsin on the way home and were able to interest the American Red Cross at Washington in the relief problem created by the recent floods which covered 15,000 square miles of territory

the lines of sanitation and the prevention of disease.

We found no strictly sanitary or medical civilian problems which were so urgent as to demand aid from America during the present crisis. The feeding of the population, and particularly of the children, in the large cities will, however, require energetic efforts if starvation and demoralizing disorder are to be avoided during the coming winter. Russia has food enough for her needs as a whole, but peasant hoarding and deficient transportation facilities prevent its effective distribution. Milk is particularly needed in Petrograd where the use of this essential food for children was limited even in August to babies under three, and where the total supply was only about one tenth of that needed according to accepted dietary standards.

In connection with this problem we worked in coöperation with the Ministry of Social Help in the preparation of plans for fourteen district feeding points in Petrograd with night refuges for the homeless. The Ministry estimated that 100,000 children would be in need of food and 5000 absolutely destitute. Here, as in the case of military relief, it was the aim of the American Red Cross to supply those things which could not be obtained by the Russians themselves,—in this case milk, —and a million pounds of condensed milk left the United States in October for the use of the children of Petrograd.

It is of course possible—but not, I think, probable—that the crisis created by the formation of the present Bolshevick government may put an end to the coöperation between America and Russia which began last summer with so much promise. Even the Bolsheviki do not dare openly to advocate a separate peace with Germany; but their policies would be likely to lead to such a result, and if Russia should definitely abandon the war the energies of America must perhaps be applied elsewhere. Petrograd is not Russia, however, and the Bolsheviki are not the Russian people. The real Russia is shaken but not shattered by three years of war, disorganized but not demoralized by nine months of revolution. In these trying days we may remember the Russia that built up the Zemstvos, the Russia that conducted an almost bloodless revolution and maintained a surprising degree of order without legally constituted authority during the ensuing months, the Russia that through the Ministries of Social Help and Education and many other agencies is planning for a new and solid future. We may think of the great mass of the peasantry, conservative and law abiding, who will find voice for the first time in the Constituent Assembly this winter, of the great Russian Church which has reformed and liberalized itself since the Revolution without losing its fervent religious faith and sense of national solidarity, of the Chevaliers of St. George and the Battalions of Death, pledged never to surrender nor to cease fighting until the German beast is chained, of the women of Russia who are not only doing more than their share of the physical labor and the thoughtful planning of the new Republic but actually have been fighting her battles at the front with gallantry and devotion.

It is this Russia which looks to America for aid. Major Stanley Washburn has said that as long as one division of Russian troops keeps up the fight against Germany we should be behind that division a million strong. If that continues to be the spirit of America, Russia will win through and will come out of the struggle strong and liberal, an effective bulwark against Prussianism after the war and a sure guarantee of peace and justice in the Far East.

VARIATION OF THE COMMON SUNFLOWER *H. ANNUUS*

A form selected from the group with light-tipped rays, obtained in 1916. The dark color is chestnut-red. Mrs. McClintock, of the University of Chicago, named it "Halo"

Sunflower garden at Boulder, where the red sunflowers were developed. Mrs. Cockerell is half hidden among her plants

The Story of the Red Sunflower

By T. D. A. COCKERELL

Professor of Zoölogy, University of Colorado

THE original red sunflower was found by Mrs. Cockerell close to our house in Boulder, Colorado. Among many wild sunflowers growing by the roadside was a single individual in which the rays were suffused with chestnut-red. It was at once recognized that here was an opportunity for the production of a new horticultural type, as well as for scientific investigation. The plant was dug up and removed to the garden, where it continued to bloom until the end of the season. The sunflower being an annual, and at the same time infertile with its own pollen, the only possible way to preserve the new variety was by crossing with the more ordinary sorts. This was done, and in the following year many plants with reddened rays were produced. These could now be crossed on one another, and a permanently red strain obtained. Today the red sunflower may be found in gardens in Europe and America, and even in Australia, New Zealand, and South Africa, all the plants being descendants of the single wild sport which appeared at Boulder in 1910.

The current manuals of botany, at least in America, pay very little attention to variation. In the new edition of Dr. Britton's *Illustrated Flora* descriptions of varieties have been omitted altogether. This may be necessary in a work of such scope, where only the briefest outline of the flora is possible. Anything like a full treatment of varieties would double the size of the volumes, with necessarily a corresponding increase in cost. Nevertheless, we must some day have a work on American

Helianthus annuus, collarette variety, parallel to the well-known collarette dahlia. The first collarettes were obtained in 1915, and are figured in *Gardener's Chronicle* (London), Nov. 6, 1915, and the *Journal of Heredity*, Sept., 1916. The present figure shows an improved form, obtained by crossing the original collarette on a chestnut-red form with light bases of rays

Plant of 1916 crop, extracted from red doubles, but showing no trace of the "double" feature. The numerous long flat rays are in striking contrast with the sunflower on the right of page 43. Sunflowers vary not only in the shape of the rays but also in their position. They may be level with the disk, or directed more or less forward, or else backward as if drooping

A variety marked nearly as in frontispiece, but the rays much more obtuse. There is also a light ring around the disc. This was chestnut red, very bright and distinct; grown in 1916 from seed received from Messrs. Sutton and Sons, of Reading, England. The form is derived from our original cultures, but has been bred and selected by Sutton

TWO TEXAS SPECIES-HYBRIDS

Helianthus annuus × *cucumerifolius* displays a characteristic color pattern similar to that of the hybrid with *petiolaris*. This figure has been published in *The Garden Magazine*, July, 1914, p. 332

Helianthus annuus × *argophyllus* shows the silvery *argophyllus* foliage and bud. This particular specimen has vinous colors on a rather buffy ground, and is a second generation cross. *Helianthus* (*argophyllus* × *annuus vinosus*) × *annuus vinosus*

SUNFLOWER ARISTOCRATS

A semidouble with long curled rays, obtained in 1915. The so-called double sunflowers are those in which the disc-florets have taken on ligulate features, paralleling the condition normal in the dandelion

Wine-red sunflowers; they were in a dull blue vase, the combination of colors being especially lovely. A spray of *Gypsophila* (baby's breath) has been added

WITH HIGH DECORATIVE VALUE FOR THE HOME

Helianthus annuus **variety** ***bifidus*** **(*Torreya*, Jan., 1915, p. 13). A form with cleft rays; this one grown at Boulder in 1915. Another form (variety *trifidus*) has the rays with three (rarely four) points**

Red sunflowers of the 1915 crop, showing the form with twisted and curled rays; a very attractive type. Such forms can be obtained both in the chestnut-red and the vinous colors

"LITTLE WONDER"—A RED SUNFLOWER

A pretty vinous form obtained in 1917; named by Mrs. Cockerell. The heads are rather small and the bases of the rays are a lively lemon-yellow

botany treating the subject with that fullness of detail which is not uncommon in modern European floras. Only by close attention to the phenomena of variation can we expect to understand the evolution of plant species, and at the same time to develop those new horticultural forms which may add so much to the wealth and beauty of farms and gardens.

We sometimes hear of the "creation" of new kinds of plants by the breeder. The plant breeder can utilize only what nature provides. In the first instance he must search for materials to serve his purposes,—for plants possessing the characters he desires to impart to his new horticultural forms. In the case of the red sunflower, the variation was so conspicuous and remarkable as to arrest the attention at once; yet even so, the chances of the plant being saved were rather slight. It is perhaps no exaggeration to say that a thousand red sunflowers might bloom in as many American towns, without anyone thinking it worth while to save the seed and carry on breeding experiments. When we come to valuable new varieties of less conspicuous plants, such as wheat or oats, the present chances for isolation and preservation are infinitesimal. Not even the professional botanist is, as a rule, trained to observe minute differences; he often actually prides himself on ignoring everything below the grade of a species. Yet these small differences may carry the potentiality of an increase in yield sufficient to feed thousands of people, or of some new form of beauty to gladden the eyes of garden lovers in two continents. Thus it would doubtless be a paying proposition for this country to employ a number of skilled botanists to make a minute study of the variations of plants, and set their observations forth in a series of cheap volumes which would stimulate a far wider and more intelligent interest in the subject.

Although in one sense the breeder creates nothing, yet he does virtually create in the sense that the new combinations he produces are in effect and to all practical purposes actual novelties. This may be illustrated by the history of the wine-red sunflower. If we take rays of the chestnut-red variety and soak them in acidulated alcohol, we get a solution which is not chestnut-red but wine-red. The red color is in

Helianthus annuus **variety** ***primulinus*****, the pale yellow type used in the first cross to obtain the wine-red (variety** ***vinosus*****) form. The primrose variety was introduced to horticulture by Messrs. Sutton and Sons, of England, in 1889, it having occurred as a sport among the ordinary orange plants a few seasons previously. The plant here figured is an improved form, with two rows of rays, recalling the star dahlias. Sunflowers with additional rows of rays have been known for a long time, however, as is shown by Vandyke (1599–1641) in his portrait of himself, now in the collection of the Duke of Westminster**

fact due to a carmine pigment dissolved in the sap; it appears chestnut because on an orange background. Knowing this, the problem was to get it on to another background, in order to bring out the wine-red color. We should have preferred white, but no white-rayed sunflowers are known. The nearest approximation is a very pale yellow, which we have found as a wild sport, but which has also been long in cultivation. In England it is called the primrose sunflower, because the color is like that of an English primrose. Crossing the full red sunflower with the primrose variety, we got, as expected, offspring like the red parent. These were raised in the greenhouse during the winter, to save a year, and were crossed with one another. Their offspring included chestnut-red, plain orange, primrose, and the expected wine-red, which is simply red on a primrose background. All this appeared, not only as expected, but nearly in the proportions which were deduced on theoretical grounds. Thus we had the following:

Species-hybrid *Helianthus annuus* (red) × *petiolaris*, the latter being the seed parent. Grown in Boulder in 1917. The *H. petiolaris* parent was raised from seed collected in Oklahoma

	Obtained	Expected according to theory
Chestnut-red	71	69
Wine-red	25	23
Orange	19	23
Primrose	8	8

The wine-red, thus obtained according to definite rules of breeding, was an entirely new color variety, yet its qualities existed separately in its grandparents. Just how it all works out, we will not attempt to explain in this article, but it is in accordance with the laws discovered by Gregor Mendel many years ago, and fully set forth in many recent works as "Mendelism."

It is often supposed that when a breeder desires to produce new plants, he has only to cross different species possessing desirable characters. The chances of success in doing this vary very much according to the kinds of plants used. Among the hothouse orchids, hybrids between different genera are common, and as they can be propagated by division, they are capable of being increased without losing their characters. Annual sunflowers, which are propagated by seed, offer much greater difficulties. The annual species so far experimented with readily cross, and produce fertile seed. This seed gives rise to hybrid plants, which are themselves so nearly sterile that they cannot be offered horticulturally. On the other hand, all the varieties of the common sunflower, *Helianthus annuus*, seem to cross without any impairment of fertility. Even the great so-called Russian sunflower produces quite fer-

tile hybrids with the prairie sunflower, which some botanists have regarded as a distinct species. Nevertheless, even where there is abundant or sufficient fertility, complex crosses break up into a number of different types when propagated by seed, and are capable of being extracted pure only after labor extending over several years. This is why apples cannot be propagated successfully by seed, although the varieties are readily preserved and spread through grafting. Dahlias, which can be propagated vegetatively by means of tubers, possess many constant varieties, although these same varieties would rarely come true from seed. Could we increase the annual sunflower in the same manner as the dahlia, we should now have about fifty distinct and recognizable horticultural forms, any or all of which could be placed on the market. Three species-hybrids are illustrated, the *annuus* parent being in each case a red variety. On page 41 the right-hand figure shows an *annuus* × *argophyllus* cross, *H. argophyllus* being a robust plant from Texas, remarkable for its white silky pubescence. The hybrid shows the silky character distinctly, and is a very pretty thing. The *H. annuus* × *argophyllus* hybrid was independently produced by Sazyperow in Russia, in this case with the object of obtaining a plant resistant to rust and other diseases. The left-hand figure on the same page represents the cross *H. annuus* × *cucumerifolius*, the latter being also a species from Texas, but small and branched. The *H. cucumerifolius* used were cultivated forms. A similar cross, except that the *annuus* used was not red, had been made previously in Europe. *H. annuus* × *petiolaris*, new in 1917, is shown on page 46. It is a beautiful plant, much branched and with numerous heads. It remains in full flower later than the common sunflower.

The remaining figures show different variations of the *H. annuus* type, some peculiar for the form of the rays, others for the color and markings. Marking factors, which control the distribution of the colors, are independent of the color factors, and may be inherited through plants which have no red in the rays at all. Thus, although *H. petiolaris* is without red, it has a very distinct pattern or marking factor, which appears in the hybrids with the red *annuus* as a red ring at the bases of the rays.

Sunflowers are cultivated very easily, and anyone may experiment with them. When carrying on breeding experiments, it is necessary to put bags on the flower heads before the flowers open, and carry the pollen to the flowers by hand, repeating the operation several times on each head. If this is not done, bees bring pollen to the flowers, and it is impossible to tell which varieties the pollen parents belong to. In Colorado, at least, we find it necessary to bag the heads at the seeding stage also, to protect them from the birds.

All the work in breeding sunflowers has been done by my wife, who has devoted her summers to it for a number of years past.

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Nature's Magic

REDISCOVERY OF A REMARKABLE WOOD, FIRST KNOWN IN THE SIXTEENTH CENTURY, WHICH PRODUCES WITH WATER A BEAUTIFUL OPALESCENCE NOT YET EXPLAINED BY SCIENCE[1]

By WILLIAM E. SAFFORD

Economic Botanist, United States Department of Agriculture

IN a vellum covered book printed in Seville in 1574 there is an account of a strange wood which had the effect of imparting to water a blue color. This wood was carried to Europe from New Spain in great quantities, and it was supposed to be efficacious for certain diseases of the kidneys and liver. So great was the demand for it that it was often counterfeited, and many kinds of wood were offered for sale under its name; but the attempted fraud could be detected easily, for, as the author warns the public, the wood must make the water blue, and "if it does not make it blue it is not the true kind; for they are now bringing a wood that makes the water yellow, and this is not the one which is efficacious, but that which makes the water blue; for the kind that will make it blue is the true wood."[2]

A wood possessing such rare qualities could not fail to attract the attention of the world and induce scientific research as to the source of its mysterious powers. There was, however, considerable confusion regarding the identity of *lignum nephriticum*, as this wood was called in Europe, and its true origin remained unknown for centuries. Pieces carried to Spain were apparently taken from large trees, yet Francisco Hernández, who was sent by Philip II to study the resources of Mexico, and who returned about the time the above account was published, was able to obtain specimens of only a small tree or shrub, called by the Aztecs *coatl* or *coatli* (snake water). He described this as having pinnately compound leaves like those of a chick-pea, but smaller, and spikes of small longish flowers; but he gave no illustration of it. His somewhat confused account was translated into Spanish from the Latin in 1615 by Fray Francisco Ximénez, who, however, did nothing to clear up its vagueness.

About thirty years later a celebrated German Jesuit living in Rome had his attention called to the peculiar qualities of this wood on being presented with a cup made of it by the procurator of the Society of Jesus of Mexico. This cup he afterward sent to his Sacred Majesty, the Emperor, as something rare and little known. In his account published in 1646[3] he described cups made from the wood, the source of which was unknown to him, stating that they turned the water not only blue but all kinds of colors. He says:

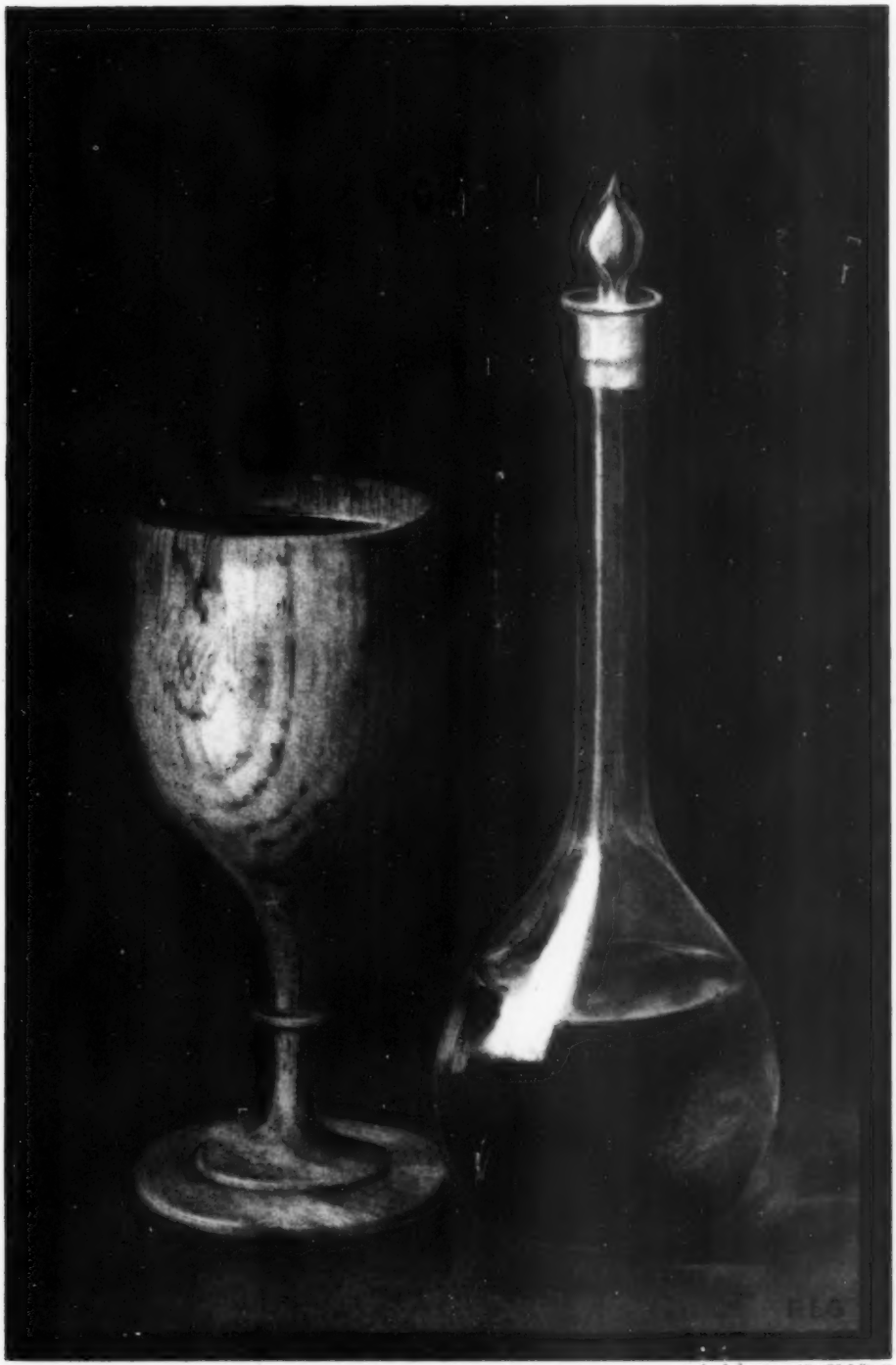
"The wood of the tree thus described, when made into a cup, tinges water when poured into it at first a deep blue, the color of a Bugloss flower; and the longer the water stands in it the deeper the color it assumes. If then the water is poured into a glass globe and held against the light, no vestige of the blue water will be seen, but it will appear to observers like pure clean spring water, limpid and clear. But if you move this glass phial toward a more shady place the liquid will assume a most delightful greenness, and if to a still more

[2] Monardes, *Historia medicinal de las cosas que se traen de nuestras Indias Occidentales que sirven en medicina*, pp. 24, 58a, 59; 1574.

[3] Kercherius, Athanasius, *Ars Magna Lucis et Umbrae*, p. 77, 1646.

[1] Published with the permission of the Secretary of Agriculture

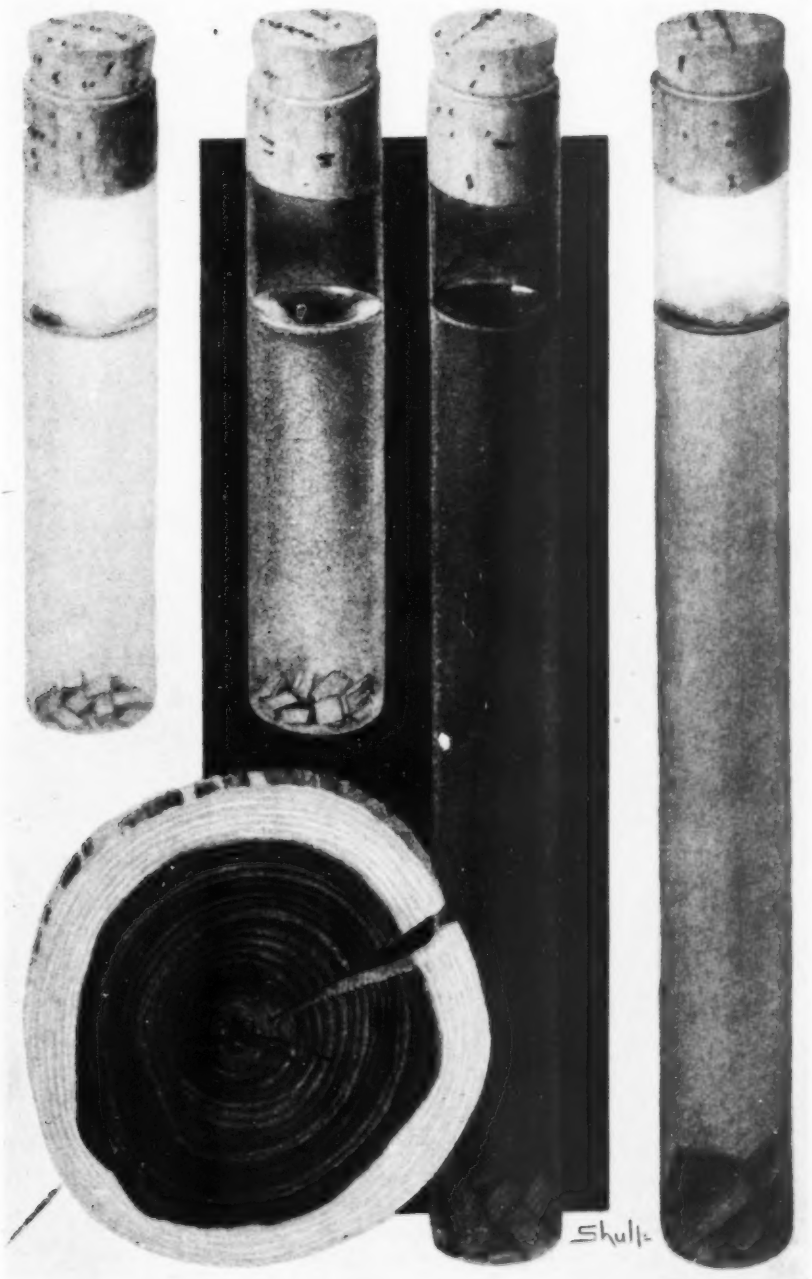
Courtesy of the Smithsonian Institution



Allsen & Co Baltimore

CUP CARVED FROM THE WOOD OF THE NARRA TREE

A mysterious chemical property which resides in this cup made from the wood of the Philippine *Lignum nephriticum* or *narra* transforms water into a liquid of the deepest blue, and this, when held against the light (as in the flask), shines with opalescent hues of fiery yellow, bright red, glowing purple, and sea green; in the rays of an arc light the liquid may shine with a blue light of sufficient intensity to illumine the faces of those standing near by. In the sixteenth and seventeenth centuries these cups were gifts for emperors and kings, and marvelous cures were attributed to the water allowed to stand in them. The phenomena have been the subject of many researches by famous chemists and physicists, yet even today the mystery is unsolved



Courtesy of the Smithsonian Institution

INFUSIONS OF THE MAGIC WOOD OF MEXICO

A section (lower corner) of the magic wood (*Eysenhardtia polystachya*) shows dark heartwood surrounded by white sapwood. The four tubes contain water with a few chips of the magic wood at the bottom of each. The colors from left to right are light greenish yellow, light opalescent blue, dark peacock blue, and brilliant orange yellow. The white sapwood is in the smaller phials. It tinges water only slightly at first, but when left over night, the infusion becomes a greenish yellow and glows with a decided fluorescence. Chips of the heartwood are in the large phials. They tinge water deep orange yellow which, held in front of a dark background, displays beautiful peacock colors

shady place, a reddish color; and thus it will change color in a marvelous way according to the nature of its background. In the dark, however, or in an opaque vase, it will once more assume its blue color."

Although he says frankly that he does not understand the phenomena, the learned philosopher, true to his boast that there was no problem in nature he could not solve, ends by asserting that his experiments have shown him the cause, which he will later publish. This, however, he never did.

Not long after, another such cup was described by a botanist[1] who received it under the name *palum indicnum.* This ingeniously made cup, almost a span in diameter and of uncommon beauty, resulting from the variegated lines adorning it, was accompanied by sawdust or shavings of the same wood, of a reddish color and of no manifest taste. When water was poured into the cup and the sawdust macerated in it, the water in a short time became tinged with blue and yellow, and when held up against the light displayed beautiful opalescent hues, giving forth reflections of fiery yellow, bright red, glowing purple, and sea green, wonderful to behold. After quoting from the earliest account of *lignum nephriticum,* the author notes that the great botanist Cæsalpinius believed the wood to be a species of ash.

It was not until 1663 that the color phenomena exhibited by the extract of *lignum nephriticum* were first investigated in a truly scientific manner.[2] The account given mentions all phases of the fluorescence, as well as the medicinal properties claimed for the infusion. The author calls attention to the fact that the wood described by the learned Jesuit previously cited was called "white Mexican wood," whereas that used in his experiments was of a darker color. He does not find exactly the same variations in color as those named by the Jesuit, but owns that a greater variety appeared when the infusion was held in a partly darkened room than when placed in full light. He discovered also that if spirits of vinegar were dropped into the liquid it lost its blue color, but not its yellow, and that the addition of salts of tartar would restore the blue.

Many writers sought to identify the wood in the centuries following its discovery, but the results obtained were very conflicting. Experiments with a piece of wood labeled *"cuatl"* in the Mexican exhibit at the Paris Exposition led to the belief that the *lignum nephriticum* of early writers was *Eysenhardtia amorphoides.* It was assumed that both the wood of the white cup which yielded an infusion colorless as spring water, and that of the reddish cup made of *palum indianum,* were identical with the dark-colored wood used in the scientific experiments just mentioned. This would mean that the great logs described as "larger than very large trees" were those of Eysenhardtia—an erroneous conclusion, since it is certain that this genus includes only shrubs and very small trees. On the other hand, after an equally exhaustive research, one author confidently asserted[3] that the source of the magic wood was not Eysenhardtia at all but a Mexican tree belonging to the genus Pterocarpus. If the statement regarding the great size of logs of this wood conflicts with the possibility of its being identified with an Eysenhardtia, so does the description of its small pinnately compound or rue-like leaves preclude the possibility that the plant described could be a Pterocarpus, in

[1] Bauhin, Johan, *Historia Plantarum,* 1650.

[2] Hon. Robert Boyle, *Experiments and Considerations Touching Colours,* p. 203, 1664, a Latin translation of which (1667), and also a summary of the results of Boyle's studies in Richard Boulton's edition of Boyle's works (1700), are in the library of the Surgeon General of the Army at Washington.

[3] See Möller, Hans-Jacob, *Lignum nephriticum.* Berichte der Deutschen Pharmaz. Gesellsch. 23:88–154. Copenhagen, 1913.

Courtesy of the Smithsonian Institution

LEAF AND FRUIT OF THE MAGIC WOOD FROM LUZON

This species of *lignum nephriticum* is a large forest tree with drooping branches, and trunk often provided with broad buttresses. The leaves, from eight to ten inches long, are composed of from five to nine usually alternate leaflets averaging three inches in length and two inches in width. The flowers are yellow. A membranous wing surrounds the large one-seeded pod

which the leaflets are not in the least like those mentioned by this investigator.

The explanation of these incongruities is quite simple. Beyond doubt, two distinct woods have been called *lignum nephriticum:* the diminutive *Eysenhardtia polystachya* and *Pterocarpus indicus,* a giant tree of the Philippine Archipelago and adjacent islands. The first of these agrees perfectly with the description of a plant with tiny leaflets and spikes of small longish flowers, while the second conforms to the account of the great logs larger than very large trees. Moreover, the wood of Eysenhardtia is so very like lignum-vitæ that Dragendorff,[1] in the absence of leaves and flowers, may well be excused for referring it to a species of that tree; and, judging from its color and texture, it seems very certain that it was the wood with which the first scientific experiments were performed. Both the red *palum indianum* and the white wood from which the famous Jesuit's cup was made may be included in the second species, for all accounts agree that of its wood there are two varieties, one pale-colored, the other reddish. In the Philippines, where the tree is commonly called *narra* or *naga,* the pale variety, which yields a fluorescence in a very marked manner, is called "female" and the red variety, possessing this characteristic in a less degree, is called "male" *narra.*

In connection with his work on the economic botany of Mexico, the writer has for years been seeking the source of *lignum nephriticum.* Among other woods examined for the blue fluorescence characterizing this were specimens of branches of *Eysenhardtia polystachya* collected by him in 1907 in the vicinity of Aguascalientes, the infusion of which gave no evidence of fluorescence in ordinary sunlight. From this fact and from the circumstance that all samples seen were either of shrubs or trees too small to yield wood for the manufacture of bowls or cups, the writer was inclined to agree with the opinion that *Eysenhardtia* must be discarded as a possible source of the magic wood. In July, 1914, however, specimens of a medicinal wood from Mexico were received for identification, accompanied by herbarium material from the same tree. This proved to be *Eysenhardtia polystachya,* known by the modern Mexicans in many localities as *palo dulce,* or "sweet wood." Its collector had not noticed anything peculiar about the color of its infusion, but dwelt upon its efficacy as a cure for certain diseases of fowls. The wood was a section of a tree trunk, which, when deprived of its bark, was 7 cm. in diameter. Unlike all other specimens of this wood seen by the writer, it consisted chiefly of dense straight-grained dark brown heartwood, very much like lignum-vitæ in appearance, surrounded by a ring of brownish white sapwood from 5 to 8 mm. thick.

A few small chips of the heartwood in ordinary tap water tinged the latter a golden yellow, which soon deepened to orange and appeared like amber when held between the eye and the window. When the glass was held against a dark background the liquid glowed with a beautiful peacock fluorescence very much like that seen in quinine. Placed partly in a sunbeam, half of the liquid appeared yellow and the other half blue; and when the sunlight was focused upon it by the lens of a common reading glass, the vial seemed to be filled with radiant gold penetrated by a shaft of pure cobalt.

There was no longer any doubt as to the identity of the wood. This could be only the Mexican *lignum nephriticum* of previous experiments, and it was undoubtedly the wood of *Eysenhardtia polystachya,* a tree with small pinnately compound leaves and with spikes of small flowers which, although originally white, had turned yellowish in drying,

[1] Dragendorff. *Heilpflanzen* (p. 345). 1898.

corresponding well with Hernández's description of the *coatl* of the Aztecs.

Chips of the sapwood tinged tap water only slightly at first, but when left over night the infusion deepened to a greenish yellow and glowed with a decided fluorescence. With distilled water neither the sapwood nor the heartwood produced fluorescence as seen by ordinary sunlight; but this phenomenon was distinctly visible when these infusions were held in the ultra-violet rays of a fluorescence lamp; and it was also displayed in ordinary daylight, when a small amount of carbonate of sodium or other alkali was added to infusions of the wood in distilled water. By boiling chips in tap water for several hours, a deep amber-colored extract was obtained, not unlike Madeira wine in color. When this extract was placed before a window it appeared to be outlined by a deep blue marginal ring, and when held away from the light, or when the light fell upon it obliquely, the fluorescence of the liquid gave it an opalescence not unlike that of certain mineral oils. A drop of the extract in a glass of water caused the whole glass to glow with fluorescence when held in the rays of the sun admitted through a hole in a screen. By ordinary electric light the infusion failed to show the phenomena; but when held in the rays of an arc light the liquid shone with an intense blue light which illumined the faces of those standing near by.

The genus Eysenhardtia is confined to America. Its range extends from Texas and Arizona on the north to Guatemala on the south. On the elevated plateau of northern Mexico it usually grows as a shrub about two meters high, in southern Mexico as a tree from six to eight meters high, yielding wood which is valuable for cabinet purposes.[1]

[1] It is probably this wood which Padre Bernabé Cobo, in his *Historia del Nuevo Mundo* (1653), described as the *arbol de la inmortalidad;* and, as the wood resembles lignum-vitæ, it is possible that the latter suggested the name which Cobo applied to it and led to its incorrect identification by Dragendorff.

That the cups described by early writers could not have been made from the dark-colored wood used in the later scientific experiments is evident; and, moreover, a search throughout Mexico has failed to reveal even a tradition of such cups. In a history of the Philippines, however, written in 1754, but remaining unpublished until 1892, a description is given of similar cups made in southern Luzon, and these are identified by the author with the long sought for cups so popular in Spain in the sixteenth and seventeenth centuries. They were made from the wood of the *narra* or *naga* (*Pterocarpus indicus*), a giant tree of the Philippine forests. The history of these cups is closely associated with the Jesuits, who concerned themselves wherever they went not only with making converts but with investigations in many fields of research. Father Camellus (George Joseph Kamel), whose name is immortalized in the lovely *Camellia*, described the tree and its wood in 1701 and called attention to the sea-blue color of its infusion.[2] Father Delgado tells of cups made of it in southern Luzon and identifies them with similar cups which he had seen at Cadiz when a child, about the year 1700. After describing the boards made from the trunk of the tree, so wide that a single one "sufficeth for making a door or a table," and praising the durability of the wood, he speaks of its medicinal virtues and adds that the cups are much esteemed in Europe where they are regarded as a gift worthy of a prince.[3]

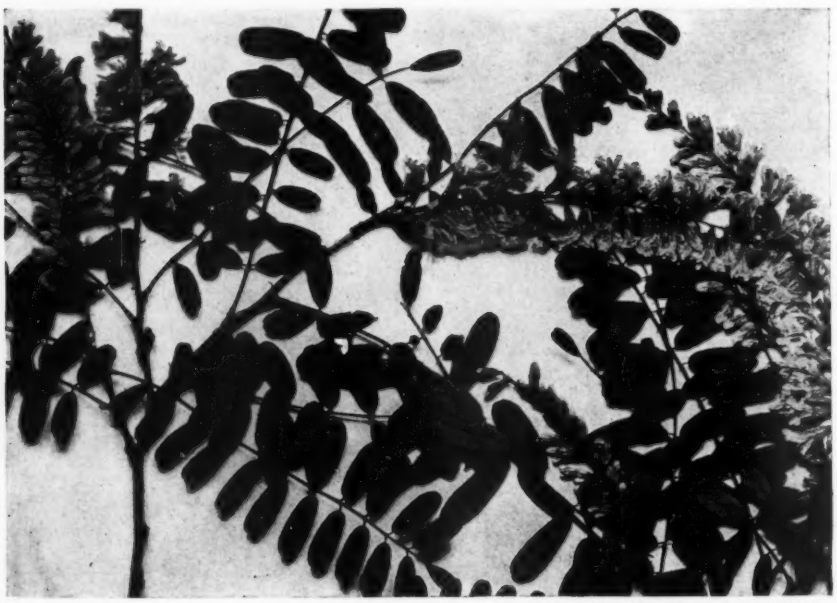
The cups were indeed presented to princes, and there can be but little doubt that those already mentioned were of Philippine and not of Mexican origin; for it must be remembered that

[2] Lignum ex subfusco rufescens, aquam in qua maceratur colore inficiens cymatili. Camellus, G. J., Descr. Fruct. & Arb. Luzonis ad Jac. Petiverium, Pharmac. Londinens. missae, anno 1701, in Raiius, Joan., *Hist. Plant.*, vol. 3, append. p. 79. 1704.

[3] Delgado, J. J., *Hist. gen. de las Islas del Poniente, llamadas Filipinas*, p. 415. 1892.

long after the discovery of America the only means of communication between the Philippines and Spain was by way of Mexico, and many products of the "Indies" attributed to New Spain were really of Philippine or East Indian origin. The *lignum nephriticum* of Mexico and that of the Philippines, although very different in grain and color, yield fluorescent infusions and extracts so closely similar that they can scarcely be distinguished. The Mexican wood resembles lignum-vitæ, the Philippine is somewhat like Spanish cedar or teak. The heartwood of the former, which is extremely compact and heavily lignified, is impregnated with a peculiar substance which can be called neither a resin nor a gum. Since this substance is not found in the wood of the Pterocarpus, it will be seen that it is not the cause of the fluorescence, which exists almost equally in the two woods. Moreover, the resin-like matter is insoluble in water, while that which causes the fluorescence is freely soluble even in cold water. Neither does this mysterious power reside in the red bodies which give color to the Pterocarpus wood.

The fact remains, therefore, that notwithstanding all the painstaking research which *lignum nephriticum* has induced, the most interesting problem regarding it is yet unsolved—the nature of the substance which causes the beautiful color phenomena produced by the wood. Renowned throughout Europe in the sixteenth and seventeenth centuries for its medicinal properties, as well as for this wonderful fluorescent quality, the magic woods have been traced to their homes in the Philippines and in Mexico and fully identified, in spite of confusing and conflicting evidence as to their identity. But that which the learned Jesuit two hundred and seventy years ago promised to reveal has continued to elude all investigators down to the present time.



Courtesy of the Smithsonian Institution

The sweetly aromatic Mexican *lignum nephriticum* (*Eysenhardtia polystachya*) sometimes occurs as a stunted bush with very small leaflets, sometimes as a spreading shrub with straight stem and recurved branches, and sometimes as a slender tree. The small, white, fragrant flowers turn yellow in drying

Game Farming for Pleasure or Profit

By HERBERT K. JOB

Of The National Association of Audubon Societies

DURING the last few years a remarkable tide of interest in the subject of game farming has arisen all over the country. Just previous to this was a period of experimentation, and of skepticism on the part of many as to the practicability of the work—comparable to a similar period in the history of aviation. Now that successful demonstration has been made by many persons, game-farming enterprises are starting up all over the United States and Canada. While efforts with some species of game are still in the experimental stage, enough success has been attained with various important species to make propagation of game clearly worth while.

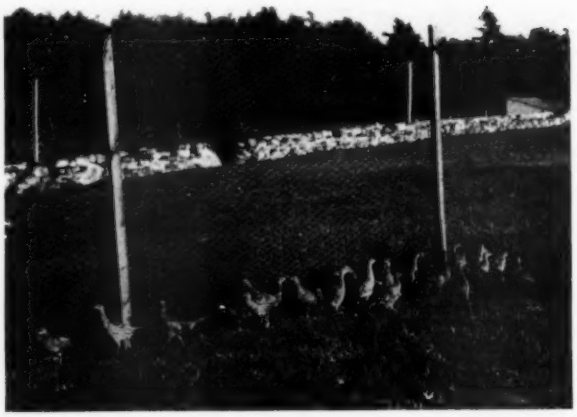
Aside from any financial profit, there is a distinct fascination which leads many to undertake such work. There is a widespread interest in wild birds, an enjoyment of their very presence, especially of kinds of any considerable size or which have become scarce. The hunting instinct, of pursuit and acquisition, is also very keen in many people. Actually to be able to produce charming wild bird life, especially such as is connected by association with exhilarating sports afield, to watch the birds grow up, to have them thus readily accessible in the open, with superior opportunity to study and observe wild traits, are most enjoyable.

The propagation of wild game is destined, furthermore, to become one of the most important factors in saving and restoring valuable species which the growth of "civilization" inevitably would render extinct. It is most important that legislation should encourage and promote the propagation of game, not obstruct it. We are just emerging from a period when progress clearly has been retarded by well-meant but short-sighted efforts to save it. A hunter pays a dollar for a license and kills, say, a hundred birds. It has been lawful to have many dead ones, but a crime to be caught with *one* alive and unwounded! Our domestic poultry was originally a wild species—very wild—with restricted range. Thanks to "game farming" it is now the most abundant and useful species on earth. Had it been "protected" as we have been protecting our game, there probably would not be one left on earth today. European countries are far ahead of us in these matters. It is estimated, for instance, that the pheasant population of England is double that of the human, the result of just a few decades of broadminded legislation, allowing people to hold, breed, and sell game that they had raised. Happily, we are emerging rapidly as a nation from our recent darkness, and state after state is passing more liberal laws.

The propagation of wild game requires careful attention to details, especially to matters of sanitation, as wild species are very susceptible to diseases of uncleanliness. No one is qualified to undertake it who has not a deep interest in the birds themselves. Always begin on a small scale, and learn the technique by first-hand experience. It would be the height of folly to lay out plans on paper and plunge into any great game-farm project. Game farming had better begin as an adjunct to other diversified farming, and make a gradual and healthy increase.

In making a beginning it is usual to start with a few ring-necked pheasants for a "try-out." These are easily obtained, are hardy, less liable to disease than some, and every dealer can fur-

nish booklets showing how to proceed. Further, pheasant raising is considered the most lucrative branch of game breeding at present, even though many are going into it. The birds are light eaters, of good size, very prolific, and both birds and eggs bring excellent prices, with wide demand for them. The common ring-necked pheasant is the best all-round species for market and for stocking game preserves. Many other kinds are reared also, more particularly for ornamental purposes, being rather less hardy, but bringing fancy prices. Of these the best known are the golden, silver, Manchurian, Reeves', and Lady Amherst's pheasants. Beginners had better learn with ring-necks before trying these.



Ring-necked pheasants, being easily obtained, hardy, and less liable to disease than other wild fowl, are usually chosen by the beginner in wild game farming. This flock is on the farm of John Heywood, Gardner, Massachusetts

The breeding and rearing of quails of several kinds, now has been made entirely practicable, although the commercial side has not been thoroughly worked out. Young quails are delightful to handle, and the actual rearing of them on a small scale is considered by some to be more easily accomplished than the rearing of even pheasants, as they stay with the hen and run with her for shelter to the coop during showers, whereas the young pheasants often merely squat in the grass, and, further, the quails stay better in one locality when grown up. The stock in confinement, however, cannot be crowded as much as pheasants without danger from epidemic diseases. Also finer wire, which at present is very costly, is required for quail pens.

The California quail (note that the brood is under the care of a bantam hen) is a beautiful bird with a glossy black plume-like crest. It takes kindly to civilization, and the young are delightful to handle. The brood here shown was raised at the Experiment Station, Amston, Connecticut

To raise pheasants, we may begin in either of two ways. We may buy eggs from a game farm and set them under hens, or we may buy, in late fall or early winter, adult breeding stock, usually one male to four or five females. If the second method is followed, the pheasants, with wings clipped, should be kept in a wire enclosure,

sheltered on north and west, and containing simple board and brush shelters under which the birds can take refuge from storms. Outdoor cold does not trouble them when thus cared for. About the middle of March they should be removed to breeding quarters. For these a separate small enclosure should be provided for each breeding unit of a cock and four or five hens. Each of these pens should be about fourteen feet square, bottomless and portable, with two-inch mesh wire, but boarded up two feet from the ground. There should be board shelters from storm, and brush heaps under which nests may be concealed. Pheasants are fed mostly on ordinary small grain, such as "scratch-feed," and any convenient "green-stuff," with a little rich laying-mash in spring. In northern districts laying begins about the middle of April.

The bluish gray scaled quail (note its conspicuous white-tipped crest) has been bred and wintered in northern Connecticut by Senator McLean, whereas it is native to a warmer home in the southwestern United States and in Mexico

The young when first hatched must be kept carefully shut in with the hen, or they will escape and get lost. After one day, hen and brood are removed to a fresh coop, fed and confined for another day, then for two days allowed to run out through slats into a very small yard. After this they are allowed to run at will, the hen being shut in the coop when there are a number of other broods, to prevent mixing and fighting of hen mothers. Otherwise the hen could range with them. By this time they know the call of the hen and stay with her. Coops had better be from fifty to sixty feet apart, in a grassy field or pasture. There need be no fence if cats, dogs, and vermin do not attack them. Preliminary trapping of vermin is important. For any considerable game farming, however, it is better to have at least two fields surrounded by wire fences, seven or eight feet high, over which animals will not jump, and over which the young sel-

United States Senator George P. McLean, who is the man that introduced before Congress the Weeks-McLean Migratory Bird Law passed in 1913, has raised ruffed grouse on his estate at Simsbury, Connecticut

dom try to fly until they are well grown, when they learn the way back and forth, getting range and natural food outside, but returning to the enclosure at feeding time. When fully fledged they can be caught readily in traps and disposed of as desired.

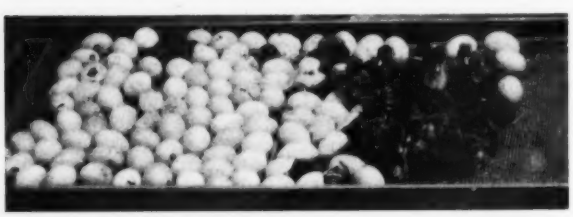
Quails are managed in the same general way as pheasants, with modifications due to the fact that the species is monogamous. The common bobwhite breeds best when separated arbitrarily into pairs, about the first of April, and each pair placed in a small, separate enclosure about eight by four feet in size, with a thick brush heap at each end and a little board shelter for storms. Each hen usually lays from twenty to forty eggs a season, sometimes more. She will seldom incubate her own eggs in captivity, and it is best to rear the young with bantams. The eggs are so small and fragile that large hens would surely crush them. For the first week after the hatching treat the young quails like pheasants, then release the hen and let her roam with the brood, as they are by that time strong enough to follow.

Other kinds of quail which can be raised are the California, Gambel's, scaled or "blue," and mountain species. All but the last are southern forms, but all can stand cold under restraint, certainly when fed and sheltered from storms, and probably, with some care, could be acclimated to conditions of medium severity, as scaled quails from Mexico have been bred and wintered free in northern Connecticut, by United States Senator George P. McLean,—although one storm took heavy toll of them. Of the scaled and mountain quails the sexes resemble each other and cannot with certainty be segregated, but fortunately all these four species breed when put together, each kind by itself, in a larger enclosure.

The common partridge or ruffed grouse, which is very hardy and might be supposed to be one of the easiest to breed, is in reality one of the most difficult, owing to peculiar traits, especially the pugnacity of the male. They are raised in confinement in small numbers, but it requires a separate large wire enclosure for each pair, making the cost prohibitive as a business proposition. Experiments, however, are under way, and some solution may yet be found. There are other kinds of grouse yet to be made subjects of careful study, notably the "prairie chickens" of the West. Likewise there is an extensive field with many foreign species of gallinaceous birds.

Our native wild turkey is beginning to be bred successfully under restraint. This undertaking requires a considerable tract of field and woodland enclosed with high wire fencing. Like the domestic variety, the wild form is sensitive to diseases of captivity, and the young have to be managed very carefully. Most of the stock sold as "wild" turkeys are only domestic ones or crosses. The domestic bird has a white or light buffy tip to the tail and the same light edging to the feathers of the rump, whereas these corresponding feathers of the true eastern form are dark rusty brown and reddish brown or maroon respectively.

The breeding of wild waterfowl is a most fascinating pursuit, especially the breeding of wild ducks, and also of some geese and swans. The main requisite is a small pond, preferably marshy. An acre or two is an ideal size, although for fewer birds one much



Mallard eggs hatching at Clove Valley Club, near Verbank, New York

Lunch time on the F. B. Dusette Ranch at Bad Axe, Michigan, which calls together a throng of two thousand wild mallards eager to be fed. The mallard, by far the easiest duck to raise, has become very prolific through long breeding in captivity

smaller will do. This should be enclosed with a wire fence six or seven feet high, one-inch mesh at the bottom for about three feet up, the rest ordinary poultry size. An equal area of land should be enclosed with the pond, preferably marsh, swamp, and field, with plenty of rank growth to hide nests. The mallard is by far the easiest to raise, and is produced on game farms in great numbers. Through long breeding in captivity it has become very prolific, and in this respect it is in a class by itself. The tendency of long confinement is to increase the size of the bird and lessen the power of flight, and in buying stock one must be on his guard, if he desires to have true wild ducks and not domestic fowl.

The wood duck, our most beautiful

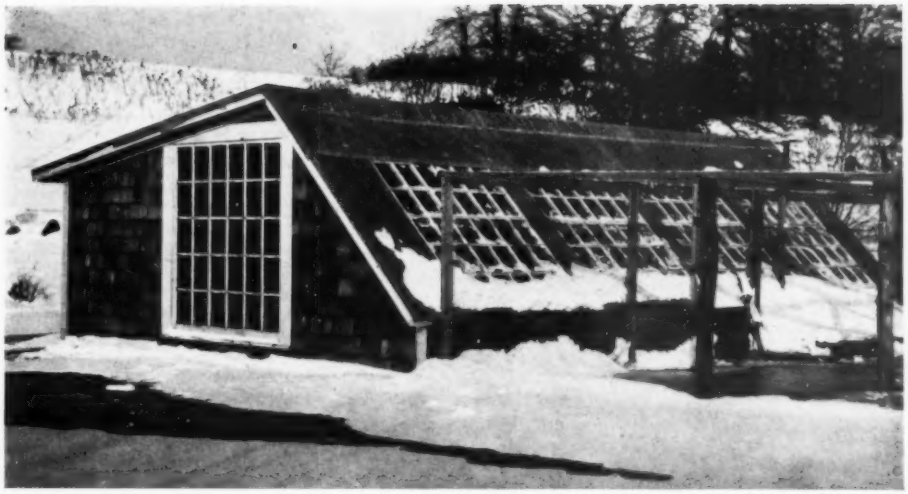
Given a small pond surrounded by an equal area of marshy land having a rank growth to hide the nests, the breeding of wild ducks will be found not only a profitable but a very fascinating pursuit. This band of young canvasbacks was raised in Manitoba by Herbert K. Job

wild native waterfowl, is a charming species to breed. Although not prolific like the mallard, it will breed every year, and produce two layings if properly managed. As with other wild ducks in captivity, to hold them in open enclosures for breeding the stock should be pinioned. This species in the wild state nests in hollow trees, but in captivity uses nesting-boxes on posts, with a cleated board walk leading up to the five-inch hole in the side. Small nail kegs answer very well, or any ordinary box. The posts are set out in shallow water preferably, or else on shore amid shelter of shrubbery. When the laying is complete, the eggs should be taken at once and hatched under a common hen, one of fairly light weight being best. The duck will probably lay another set, which she may be allowed to hatch and raise, provided the pond is free from large fish, frogs, turtles, or snakes, and there are not many other ducks. Wood ducks are in great demand as breeding stock, and bring from $10 to $20 a pair, so that their propagation is quite profitable. Until recent years most of the stock used in this country was raised in Holland.

Wild ducks' eggs also hatch quite well in incubators, if given all possible moisture, and the young can be raised in brooders, although it is easier and less exacting work to employ hens. In the latter case the hens are kept shut in the coop, and the young allowed to run in and out through slats, confining them to a wired yard on grass, and moving them to a new spot now and then. The coop should be kept very clean, and fresh sand frequently spread over the bottom.

Of course there are many other kinds of wild ducks, but the work of breeding them in this country, especially our native kinds, is still in its infancy. The main hindrance is that wild captured ducks are loath to produce eggs at first. If kept in a suitable pond where they are not disturbed, and where there is plenty of cover, although they do not lay the first year, they probably will begin the second season, and do still better the third. The young should be reared by hens, and will be tamer and more ready to breed than their parents. This is the way to build up breeding stocks and solve this problem with various native species hitherto largely un-

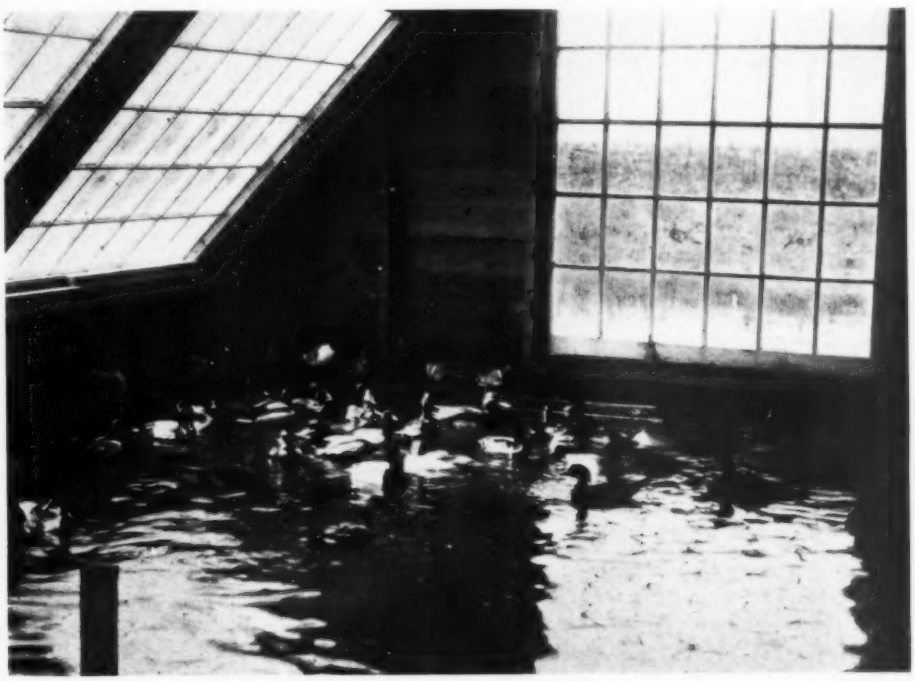
A band of wild Canada geese raised by W. R. Truman, of Marshall, Illinois, demonstrates the great possibilities in domestication of wild fowl. Geese and swans are hardy birds, requiring little care, yet not many instances are known of their being bred in captivity



The Amston Experiment Station, in Connecticut, has solved the serious problem of wintering wild ducks. A simple structure, 16 by 24 feet, is built on posts set out in the pond. It is boarded down into the water to within less than a foot of the bottom of the pond and from there down is shut in with wire attached to a board sunk into the mud

tried. Such hand-reared stocks will prove very valuable, and already are in great demand at special prices. Those who produce them first will obtain the greater rewards.

Geese and swans raise their own young. The various species are hardy and mostly take care of themselves, except that one must feed them a little grain. They are very pugnacious dur-



The house faces south, with large windows in front and on the west. In the sunny swimming pool, which occupies two thirds of the interior, the water never freezes, although there is no artificial heat and the outside temperature may drop far below zero

ing breeding time, and each pair must have a considerable area entirely to itself. The common native wild Canada goose breeds readily in captivity, but thus far there have been very few instances of other species of American wild geese breeding in captivity. The same is true of our wild swans. There is here a large field for experimental research.

Practical propagation of upland game birds and wild waterfowl by the public is now an accomplished fact, and is one of the most fascinating modern developments of popular study of wild birds. It is a real delight to see one's own broods of pheasants or quails feeding on the lawn or in the pasture, or one's own wild ducks swimming trustfully to their protector on the pond shore asking for food,—the same wild game species, it may be, that one has hunted in glorious bygone days afield. I speak from happy experience, as can many others, and I advise lovers of the great outdoors and its wild denizens to try for themselves this new intimate relationship with wild bird life.[1]

[1] Realizing that "game farming" is proving one of the very best means of interesting the public in wild bird life, its conservation and increase, the National Association of Audubon Societies more than three years ago founded its "Department of Applied Ornithology," in charge of the writer, the purpose of which is to interest and instruct the public in practical measures to increase wild bird life. These measures include attracting, feeding, and protecting wild birds in general, and the direct propagation of those kinds amenable to such measures. Besides employing various lines of instruction, such as publications, inspections, correspondence, lectures, photographs, and motion pictures of wild bird life, the department has been enabled to secure and conduct a demonstration and experiment station in applied ornithology, which includes, among other branches, "game farming." This is at Amston, Connecticut, and is the property of Mr. Charles M. Ams, of New York City, who has placed it at our disposal, with generous aid in various ways. The tract embraces about three square miles of beautiful diversified country abounding in bird life, and is the natural haunt of a good variety of wild game. It includes a picturesque wooded lake more than a mile long, which wild fowl frequent, and also other smaller ponds. Here we have begun various lines of bird work, including the breeding of several kinds of game birds and of wild ducks. In a fenced pond and swamp, an enclosure of several acres, are kept fifteen species of wild ducks for propagation experiments, including a fine stock of canvasbacks.

The problem of wintering wild ducks in cold latitudes has always been a serious one, and this experiment station has already hit upon a method which furnishes a real solution. This is an aquatic house built on posts out from the shore of the pond. It is a simple structure, twenty-four by sixteen feet, boarded down into the water to within less than a foot of the bottom of the pond, thence with wire to a board sunk into the mud. It faces south, with four large frame windows in front and one on the west side. Within, two thirds of the area is a swimming pool, the remainder a dry platform, on which the ducks come out to feed and rest. The sunshine pours in so effectively that the water never freezes although there is no artificial heat, and outside in midwinter the ice freezes two feet thick, with the mercury at times fifteen degrees below zero. The deep-water or diving ducks always have been the especial problem. If kept out of water during winter their feet are apt to freeze, and become sore and lame, as these birds are not well adapted to much walking. The new plan winters them and every other species in the most comfortable fashion. Even the most tender species, such as the blue-winged teal, thrive under it. I consider it very much better than to try to make the ducks live outdoors all winter in a little air hole in the ice which they keep open by swimming around all the time, getting frozen in during severe spells and needing to be chopped out in the morning, often with vitality greatly reduced by spring, making them unfit to breed. By this new plan they come through in splendid condition.

The department, during the summer, while the breeding and rearing are under way, gives instruction in practical details of propagation of game birds and wild waterfowl, and of attracting wild birds, and all persons who are interested in such matters and desire to learn are welcome to come to the game farm at Amston. It is planned during the coming season to hold regular summer school sessions. The tract has just been made a State Game Preserve and Sanctuary, one of the largest in Connecticut. All the propagation or "game farming," and the more important features connected with it, are within easy walking distance of Amston railway station, which is on the Air Line Division of the New Haven Railroad, between New Haven and Willimantic, ten miles from the latter. Those who desire it will be well cared for at the Amston Inn. The National Association of Audubon Societies has a residence at headquarters, called the "Audubon House," where visitors are received, and where are collections of pictures, and of mounted birds, also books and publications relating to bird life. The writer will gladly answer inquiries addressed to the New York office of the Association, 1974 Broadway, or to his home at West Haven, Connecticut.—THE AUTHOR.

Mr. Roy Chapman Andrews, leader of the recent Asiatic Zoölogical Expedition sent to Yunnan, China, by the American Museum, and author of *Whale Hunting with Gun and Camera*, a popular narrative covering his previous expeditions to all parts of the world in a study of whales

Giant Mammals of the Sea

REVIEW OF A NEW BOOK ON WHALE HUNTING[1]

THE readers of the JOURNAL know Mr. Roy C. Andrews from the accounts of his expeditions to Korea, Japan, and recently to China, as well as by the interesting descriptions, accompanied by equally interesting pictures, of his adventures in search of whales.

When Mr. Andrews started on his last trip to the Orient he left in the hands of the printer a book setting forth his experiences with whales, which shortly after appeared under the title of *Whale Hunting with Gun and Camera*, Mr. Andrews being equally adept with either weapon.

The observations were made during the course of expeditions carried on over a period of several years with the intent of obtaining for the American Museum of Natural History an unrivaled series of whales whose skeletons and counterfeit presentments in the way of reproductions should be gath-

[1] *Whale Hunting with Gun and Camera*, by Roy Chapman Andrews. D. Appleton and Company, New York, 1916. pp. 321, illustrations from photographs by the Author.

Courtesy of D. Appleton and Company

To capture a whale with either gun or camera requires a quick eye and a steady hand. This photograph, in which appear the back of the whale on the surface of the water, the harpoon and line and the black smoke from the discharge of the gun, shows that the click of the camera and the crash of the gun were almost simultaneous

Courtesy of D. Appleton and Company

As the huge gray form rises from the water with clouds of vapor spouting from the open blowholes, the excitement is intense. The gunner, standing by the photographer with his harpoon gun ready, cries, "I shoot, I shoot!" His words are drowned in the roar, as camera and gun act in unison

ered into a great hall of marine life. Mr. Andrews did his part; the material has been brought together, but, alas, it rests in great crates and dark storage rooms awaiting the coming of more peaceful and prosperous days when these leviathans shall be gathered together for the edification of the public. Meanwhile we have his book to keep up our interest in the subject.

In this book Mr. Andrews takes us from Long Island to the Pacific coast and Japan, with side excursions to Alaska, Bering Sea, and the St. Lawrence, but most of his studies were pretty evenly divided between Vancouver and Oshima.

Mr. Andrews has participated in many a whale hunt: he was almost "in at the death" of one of the last whales taken at Amagansett where whaling is, or was until the whales gave out, carried on exactly as it was at its birthplace on the Basque coast a thousand years ago. And yet we call this a progressive age.

We are told how whales feed and play, how they care for and nurse their young, of their enemies and diseases. We are shown many phases of the capture of whales by modern methods; learn how they are pursued, killed and utilized, turned into oil and fertilizer or, as in Japan, sent to market to furnish food for thousands—as is beginning to be done here. And if, as a rule, the business-like methods of modern whaling lack the excitement and danger incident to the capture of the sperm whale,—which, by the way is still pursued and killed just as it was a century ago,—there are yet occasions when whaling by modern methods is sufficiently strenuous for the ordinary individual. Such an incident was the chase and capture of a great blue whale, which lasted from sunrise to sunset: twice the whale was struck and twice he escaped, once by the breaking of the line which stands a strain of twenty tons, and when he was finally killed by a third shot, the steamer was 130 miles from home.

If excitement is usually lacking, there is plenty of hard work and discomfort, but as a matter of compensation, it is now possible to study whales as never before, to photograph, measure, and examine them at leisure, so that although the whales are rapidly disappearing, we are getting to know more and more about them.

Mr. Andrews' book is rounded out by chapters on old-time whaling, in which we are told how the sperm whale, the fiercest fighter of his race, was hunted during what may be termed the golden —in some cases most literally golden— age of the whaling industry, and how the great but clumsy bowhead was chased from Spitzbergen to Greenland and Bering Sea and then all but blotted out of existence, and how his cousin, the right whale, which was driven from Spain and Nantucket into the far north, has become a name only over most of his former range.

The smaller whales and porpoises are not forgotten, and we read how the bottlenose whales are taken in the North Sea and the porpoises off Hatteras, how the Indians chase the white whale in the St. Lawrence, and how the stupid blackfish are rounded up and driven ashore on the Faroes and Cape Cod. All these things, and many more, we are told in *Whale Hunting with Gun and Camera*, supplemented by many pictures of whales and whaling methods.

With the exception of the few chapters noted, this book is the record of personal experiences, and Mr. Andrews may say with Æneas—"all of which I saw and a great part of which I was." And it is only fair to Mr. Andrews to add that he tells his adventures more modestly than did Æneas, who made more of a to-do and got into more mischief during a cruise over a small part of the Mediterranean than Slocum did in circumnavigating the globe in a twenty-ton sloop.—F. A. Lucas.

Favorite Food Fishes

THE NEW YORK MARKET SUPPLIED FROM INLAND AND OCEANIC WATERS, NORTHERN AND SOUTHERN ATLANTIC SHORE FISHERIES, AND VERY CONSIDERABLY FROM THE PACIFIC

By JOHN T. NICHOLS

TO rank as one of the most desirable fish in a big market like that of New York City, a species must have other things in its favor than mere excellence of flesh. To begin with, the number of first-choice fishes is limited by the number of fish names the average consumer finds it worth while to hold in his memory. There is little demand for an unknown article. This number varies from about ten to twenty. The first ten in the New York market are something like the following: shad, salmon, smelt, Spanish mackerel, bluefish, striped bass, kingfish, cod, halibut, and "sole."

The first six in the list justly earn their preëminence, each having qualities which particularly appeal to certain palates. The position of the salmon doubtless is made still more secure by its long sporting career, and the general difficulty the populace has experienced in obtaining it in the past. At times and places where it has been very abundant in the market it promptly has lost favor. Spanish mackerel, bluefish, and striped bass at times are caught locally as game fishes. The bluefish especially has a local reputation as a game fish, which helps its sale for the table. There was a time when the bluefish was not well known hereabouts and there was no sale for it.

The kingfish is a very delicious little fish which was more abundant near New York City at one time than it is now, and more extensively angled for. This unquestionably helped to bring it to the fore, as did also its regal name. Various species of fishes in different parts of the world go by the name kingfish, and these, so far as I am aware, are always esteemed as food. The kingfish in this vicinity is a small species allied to the weakfish and drum. The kingfish of Florida is a large mackerel not only sought for sport but also holding a high place on bills of fare in the South. New York imports a large quantity of this fish. In New York, however, the name kingfish is preoccupied, and the southern fish therefore is marketed as sering, becoming one of the less desirable and cheaper fishes. A delicious fish the size of a smelt is called kingfish, or to be more exact, *pez-el-rey*, in Argentina. Some years ago, I remember, a ship northbound from that part of the world brought some of these southern fish on ice to the New York market, whence one of them came into the hands of the American Museum of Natural History. The Museum had at first no inkling as to its place of origin and was inclined to consider it a species new to science, as it certainly differed from any fish caught locally and even from those species which might have been imported from the Pacific coast.

Cod and halibut are northern fishes which were obtainable in large quantities by early English fishermen. Their appreciation is traditional with the Anglo-Saxon race, which accounts in part for the high esteem in which they are held. They belong to that group of fishes whose general southern limit lies about in the vicinity of Cape Cod. It is natural, therefore, to find them occupying an even more important place in the market of Boston than in New York.

The name "sole" has an important place on bills of fare, doubtless due to the justly earned reputation of an abundant and delicious European species of the name. The writer has never seen true sole served on this side of the Atlantic, however, save on an ocean steamer lying in New York harbor. The demand for "filet of sole" is filled very largely by flounders of various species, excellent fish to be sure but not notable above many others. Of late years a particular species of flounder has appeared in the market which through usage is acquiring a right to the name "sole," or "lemon sole." This is a deep-water form (*Glyptocephalus*) which

has been brought to the notice of the trade by the United States Bureau of Fisheries. The only common fish found on our coast which might, from the point of view of science, have a right to the name is virtually worthless for food, small with very rough scales so that it can scarcely be drawn through the hand tail first. It is said that if a hog should attempt to eat one of these fishes tail first, he would be choked by it; in some localities it goes by the name of "hog choker." While we are discussing the subject of flounders and soles it is appropriate to mention a small species known as sundial or sand flounder which is rather common locally on sandy bottoms. This fish is really one of the most delicious found in the sea but probably never will rank high in the market because it is not obtainable in sufficient quantity to become known. Furthermore, its flesh is transparent, so that if the fish be held to the light the shadow of an opaque object may be seen readily through it, which gives the impression of its being very mean and poor. The European turbot, of which it is the closest American relative, shares in this translucency of flesh to some extent.

The second ten fishes for which there is great demand in the New York market comprise something like the following: whitefish, mackerel, butterfish, pompano, sea bass, red snapper, porgy, sheepshead, weakfish, and sea trout. Weakfish, sea bass, and butterfish are obtainable in large quantities in local waters. Weakfish, sea bass, porgy, and sheepshead are objects of pursuit by the local fraternity of salt-water anglers. Red snappers and pompano are among the most excellent southern food fishes which may be shipped in good condition and considerable quantity to the New York market. The whitefish is perhaps the most important fresh-water species taken in our inland fisheries; it is allied to salmon and trout. Sea trout is the southern representative of our weakfish, and is somewhat better flavored. Doubtless its name of trout—to which, by the way, it has not the least ichthyological right—aids its sale here, trout being a familiar English household word. The mackerel, like the cod and the halibut, is a traditional food of English-speaking peoples, and even salt mackerel has a large sale, although to the writer's mind it is one of the least enjoyable forms of nourishment purchasable. Whitefish has very delicate white meat and is most delicious broiled. Also, a fine large good-conditioned red snapper baked is unsurpassed.

Availability of a steady supply of any species is one of the requisites for its proper appreciation in the market. The eastern salmon supply is very largely exhausted, but fresh salmon are brought on ice from the Pacific coast. Through the winter these are mostly steelheads. In spring the Chinook salmon is running in the Columbia and other Pacific rivers and about a week later makes its appearance in the New York market. The cold-storage salmon here is very largely the silver salmon, a western fish that runs later in the season than the Chinook and that can be caught in quantities when Pacific Slope rivers are low. These fish when taken are approaching the spawning period and therefore in poorer flesh than the other species; cold storage does not improve their quality, and the fresh fish when it comes into the market, although more expensive, is well worth the difference.

During periods of the year when the bluefish is not taken in the latitude of New York it is imported from points farther south. Through the winter a large amount of Spanish mackerel is shipped north from Florida. It is properly cleaned and packed there, and in excellent condition when it appears on our tables. Cod and halibut reach us from the north, being taken off the shores of New England and on the offshore and Newfoundland banks, although of late years I believe the latter species especially has decreased in the Atlantic, and a good deal of it comes from our Northwest Coast.

The market in a metropolis like New York is in part controlled by foreign elements in the population that have brought from their home countries the taste for special kinds of fish. Thus we find that there is a large sale of skates to French people living here, the skate being an important market fish on the northern coast of France, and highly esteemed.

As to the food excellence of any kind of fish, the condition in which it is marketed plays as important a part as does the species. Certain fish dealers of intelligence become very expert in judging the intrinsic merit of the wares they handle. If one can select such a reliable dealer who has been proved a

good judge of fish, and will give him latitude in the species furnished, a greater variety probably can be used, without danger of making a mistake, than would be practicable to purchase in any other way. Probably about a hundred species worthy of trial occur each year in the New York market, which has a geographical position rendering it accessible to a greater variety of good fresh food fishes than any other world market with which I am familiar.

Occasionally delicious food fishes not ordinarily common in the vicinity of New York become abundant and are taken in large numbers. A case in mind is that of the croaker, a very excellent pan fish which was abundant during the past summer. Under existing conditions this catch of croakers was wasted. There should be some way of "taking up such slack" in the market possibilities.

Certain notable fishes are especially worthy of introduction into the market either because of their special excellence or, if of an inferior grade because they can furnish a cheaper supply of fresh and wholesome fish. From time to time the United States Bureau of Fisheries institutes more or less successful campaigns for the introduction of such species. A recent attempt of this nature to introduce the tilefish seems to have been one of the more successful, perhaps because tilefish has an attractive and striking appearance and a distinctive and easy name.

On the Pacific coast many smeltlike fishes of great delicacy of flavor are taken in large numbers. There probably is no reason why the people of New York should not have regularly the benefit of this supply, but we are not aware that these species have been brought to our market to any considerable extent. A fish common on the Pacific coast is the black cod (*Anoplopoma fimbria*) of very distinctive and agreeable flavor. I find that one of the things I look forward to with great pleasure in a visit to Seattle, is the opportunity to order a portion of this fish in one of the restaurants there where it is very largely used. A few years ago I learned that black cod was being shipped east after having been cured in a special manner—in just what manner I never discovered—and that it was being served regularly in one of the downtown luncheon clubs. It was thereafter my custom to visit that club as frequently as I could to enjoy this delicacy of the Northwest. Unfortunately the discovery was made presently by pure food agitators that the preparation of the product entailed giving it a somewhat artificial color, which was not allowed, and the supply was shut off.

There should be a greater utilization of shark for food, many species having flesh which is nutritious, palatable, and not at all tough. That they are not eaten more in this vicinity seems largely due to prejudice. They should be obtainable in sufficient quantity and with sufficient readiness to be salable at a reasonable figure. Furthermore, if the destruction of shark were put on a commercial utilization basis, the supply of other food fishes, upon which sharks prey, would be augmented.

Roughly, for commercial purposes, the fishes of the world may be divided into four categories. Those of the north occur at various depths, often in vast schools, and are frequently taken on offshore banks. In general they are firm of flesh and excellent as food. The fish of temperate latitudes are found characteristically near sandy shores. This group contains a great variety of delicious species. Then there are fishes of the tropics, found about coral reefs, or in deeper water. Difficulty of obtaining any one variety of tropical fishes in great quantity, and special problems in marketing them, probably preclude their export, although in many places they form an important factor of local food supply, and should do so in others. Finally there are fishes of fresh waters.

New York is almost unique in its accessibility to a fish supply from the first two and more important groups. Our hot summers raise the temperature of the inshore sea water to the neighborhood of seventy degrees Fahrenheit, and bring fishes of the second group north into our bays. The bleak northwesters of winter bring the cod down to us from behind Cape Cod. Local familiarity thus obtained with both northern and southern species introduces them to the market, and at any time of year they are readily imported from a little farther north or south along our coast. At the same time transportation facilities from the west enable New York to obtain fish readily from the extensive inland lakes and rivers, and even to tap the unrelated fishery resources of the distant Pacific.

Doubtless the fish supply of New York,

and indeed of America, is capable of great expansion, but in turning to fish as a war food we should not lose sight of certain problems involved. Whereas some species have been overlooked, others already are utilized to such an extent that they cannot recuperate from the inroads made upon them. In increasing our consumption of these we are still further eating up our capital. Then not only does the price of fish rise in sympathy with that of other commodities in response to economic laws, but, furthermore, labor is involved in obtaining fish just as in raising cattle or potatoes, and it is primarily the shortage of labor which is bringing hunger home to us.

Museum Notes

SINCE the last issue of the JOURNAL the following persons have become members of the American Museum:

Patron, MR. GEORGE G. HAVEN.

Life Members, MRS. JAMES J. GOODWIN, THE REV. HARRY R. CALDWELL, PROFESSOR C. R. KELLOGG, DR. WILLIAM DILLER MATTHEW, MESSRS. THOMAS BARBOUR, EPH. A. KARELSEN, GEORGE MERCER, CHARLES A. SCHIEREN, and ADOLFO STAHL.

Sustaining Member, MR. C. H. TENNEY.

Annual Members, MESDAMES SYLVAN BIER, J. M. COHN, JOHN HOWELLS, MAX KOPS, G. LANGMANN, LUCIUS K. WILMERDING, FRANK S. WITHERBEE, MISSES FLORENCE DEAN, VIRGINIA S. LOEWENSTEIN, MESSRS. JAMES ABBOTT, GEORGE J. BALDWIN, FELICE BAVA, A. C. BECHSTEIN, JOSEPH P. BICKERTON, JR., ROY CURTISS, BENEDICT ERNSTEIN, B. M. EWING, DUDLEY B. FAY, E. ROLAND HARRIMAN, HENRY LAMBELET, ISIDORE H. LEHMAN, JOHN B. LUNGER, MAX L. MASIUS, J. DOULL MILLER, WILLIAM W. MILLER, LOUIS H. MOOS, BEVERLY ARDEN NORRIS, BENJAMIN PATTERSON, WILLIAM RENULT, HAROLD A. ROSENBAUM, MORRIS ROSSIN, RAYMOND W. STORM, THOMAS W. STREETER, MYRON C. TAYLOR, B. B. THAYER, ROBERT VAN IDERSTINE, C. PALMER WOODBURY, THE REV. WM. BREWSTER HUMPHREY.

Associate Members, CAPTAIN HENRY ROWAN LEMLEY, MESSRS. GEORGE WHITEFIELD DAVIS, ALBERT DOUGLAS, CHARLES C. GLOVER, ROBERT J. MCKAY, CHARLES LESTER MARLATT, WALTER S. MITCHELL, H. A. NEBB, F. CURTIS PERKINS, JR., HENRY CLIFFORD STUART, J. M. TATE, JR., JAMES TODD, EDGAR J. UIHLEIN, HARRY H. WILLOCK, JOHN WOODWELL, THE HON. WILLIS VAN DEVANTER.

THE sudden death, on December 19, of Mr. L. P. Gratacap, curator of mineralogy and of mollusca, was a great shock to his many friends in the American Museum, where on that very day he had been at his desk. Mr. Gratacap has been identified with the American Museum of Natural History since October 4, 1876, when the collections were still housed in the old Arsenal Building. Since the death of Professor R. P. Whitfield, in 1878, he has been dean of the scientific staff, having been in the service more than forty years. During this period he has held successively the positions of assistant curator of mineralogy, assistant curator of geology, curator of mineralogy and conchology, and curator of mollusca, the last of these since 1909, when he was placed in entire charge of the mineralogical and conchological collections.[1] The funeral services were held in Trinity Church, New York City, where the American Museum was represented by the many members of the staff who were his personal friends.

THE death is announced of Mr. Augustus R. Strader, head carpenter at the American Museum of Natural History. Mr. Strader has been actively employed in this institution for eighteen years. The members of his department as well as his many friends throughout the building mourn his loss.

THE Executive Committee of the American Museum at a recent meeting confirmed the succession of Mr. George G. Haven to the patronship of his father through the endorsement of his patronship certificate. The Rev. Harry R. Caldwell was elected to life membership in appreciation not only of his gift to the Museum of a collection from China of about 8000 insects, but also of his assistance to the Asiatic Zoölogical Expedition during its recent work in Yunnan. Professor C. R. Kellogg was made a life member

[1] The JOURNAL will publish a biographical sketch of Mr. Gratacap in a later issue.

in acknowledgment of his invaluable aid to the Asiatic Zoölogical Expedition and his continued interest in the development of the American Museum. Dr. William Diller Matthew also was elected to life membership in recognition of his many services to the Museum and of his scholastic attainments.

THE AMERICAN MUSEUM has offered to the National War Work Council of the Young Men's Christian Association the choice of any of its thousands of miscellaneous lantern slides which may be found suitable for the entertainment of soldiers in camp, either in this country or abroad. A cable received from France by the War Work Council asked for as many colored slides as possible, with a range of subjects embracing architecture, art, science, war, and the scenery of various countries. The Museum is preparing also a series of lectures to be circulated among the camps. Four of these now in course of preparation are: "Hunting Elephants and Other Big Game in Africa," by Carl E. Akeley; "Whale Hunting with Gun and Camera," by Roy C. Andrews; "Down the River of Doubt with Colonel Roosevelt," by George K. Cherrie, and "Bird Life on an Antarctic Island," by Robert Cushman Murphy. The manuscript of each lecture will be accompanied by about one hundred slides. The lecture, prepared in the first person, may be read before the soldiers with the same effect as if given at first hand. Another plan of the American Museum for providing relaxation and recreation for the soldiers, is the loan of some of the best of its motion picture films, such as the Crocker Land material and the travel films of Japan and China taken by Roy C. Andrews. These will be so fully titled and captioned that they will be self-explanatory.

MANY copies of the AMERICAN MUSEUM JOURNAL are now being distributed to the libraries of forty-five army and navy camps.

AT a recent meeting of the New York Academy of Sciences the following members of the American Museum scientific staff were elected Fellows in the Society: Dr. Thomas G. Hull, of the department of public health, Dr. F. E. Lutz, associate curator of invertebrate zoölogy, and Mr. Barrington Moore, associate curator in woods and forestry. Dr. C. C. Mook, who is engaged on special research work in the department of vertebrate palæontology, was also elected Fellow.

MR. C. WILLIAM BEEBE, curator of birds in the New York Zoölogical Park, has returned from the Tropical Research Station established last year in British Guiana by the New York Zoölogical Society. While the intention of Mr. Beebe's short trip was principally to salvage books and instruments until after the war, and to seek rest from an airplane accident, yet opportunity was found for a month of investigation. Several thousand specimens, ranging from mammals to insects, were collected, and more than eighty-five representatives of various groups were brought back alive. Among these were a young tapir, an imperial Amazon parrot, and a silky anteater (*Cyclopes didactylus*), the latter species brought north for the first time. More than ninety paintings and sketches of zoölogical subjects were obtained by the director's assistant, Mr. John Tee Van, and by Miss Isabel Cooper. The list of known birds of Bartica District was increased to more than four hundred species.

MR. LESLIE SPIER has returned from a journey to Zuñi, Arizona, undertaken the latter part of October to continue archæological investigations begun in the summer of 1916. His researches indicate that the Zuñi at one time disappeared from the Zuñi Valley, to return later. Just where they went during the period of their absence from the valley is the object of the present investigation. As no trace of their wanderings had been discovered in the north and east by former expeditions, Mr. Spier confined his explorations to the western and southern parts of the territory.

THE department of anthropology of the American Museum has installed a new exhibit of rare Indian baskets in the Southwest hall of the Museum. There are Mission baskets worth almost their weight in gold. These are made of the stems of California grass sewed together with juncus reed, or the shoots of the sumac, in their natural colors. The reed imparts mottled variations of yellow, brown, and green. The black shades are produced by dyeing the juncus stems with elder. These colors are arranged in horizontal bands of simple and artistic geometric designs. Soft-toned Tlingit basketry of the Northwest shows the great skill of the Tlingit Indians in the selection and blending of colors.

THE model which has been made of the *Manta* or "devilfish" captured in Florida for the American Museum some time ago by Mr. Russell J. Coles, has been worked into final form in the department of preparation and will soon be on public view. Many mechanical difficulties had to be overcome to produce a thoroughly satisfactory exhibition specimen of this great diamond-shaped ray, which is more than eighteen feet across. The completed model, however, will be not only the first of its kind to be placed on exhibition in any museum, but also of an excellence which must remain unsurpassed for years. *Manta,* meaning "blanket," first applied to this sea monster by Spanish-speaking peoples on account of its great breadth, is in many respects more desirable than the English name "devilfish," to which the giant octopus has prior claim.

THE library of the American Museum of Natural History reports an exchange relationship with the Straits Branch of the Royal Asiatic Society. With the establishment of the exchange, the library has acquired a complete file of the valuable *Journal* of this society, treating of the natural history and anthropology of the general locality of the Malay States. The field is one which has been long in need of material, and the Library is particularly glad that, in spite of the war, the exchange has been established at this time. Another recent accession is *Traité Élémentaire d'Entomologie* by Maurice Girard, volumes 1–3 and atlas, published in Paris 1873–1885.

THE AMERICAN MUSEUM has purchased from Mr. Charles L. Romaine one hundred and fifty prehistoric pottery vessels from the shore of Chareo Azul, David, Province of Chiriqui, Panama.

AMONG the semi-annual additions to the collections of the department of mineralogy are a number of very interesting specimens, notable for size, scientific interest, or beauty. Worthy of mention are: a large group of translucent brown barite crystals, from Cumberland, England; a very beautiful intercrystallization of white quartz and amethystine fluorite from Durham, England; a singular tubular group of smithsonite from New Mexico; crystals of wavellite; a broad crystallized plate of sphalerite from Colorado; a remarkable honey-colored crystal of scheelite (calcium tungstate), being a pyramid of unusual size, from Sonora, Mexico; a striking specimen of calamine from Leadville, Colorado, formed of gray-white blades of the mineral in a mass of shining spheres; a deep orange ball of diadochite; two mammoth crystals of betafite from Madagascar; and many others. The most remarkable addition to the collection has been the large lump of native antimony, weighing ninety pounds, and which so far as our knowledge goes is unique. It was taken from Kern County, California. It is hoped that the department will be permitted in the near future to begin an installation of artificial mineral crystallizations, such as are formed in the arts. A small beginning has already been made, and chalcanthite, alunite, gypsum, and borax, all synthetic productions, fine in color and perfect in crystallization, have been purchased.

DR. HERMAN K. HAEBERLIN, who visited the state of Washington in pursuance of ethnological work on a Columbia fellowship, gathered for the American Museum a considerable collection of specimens from the fast disappearing Indian tribes of that state. Baskets, bows and arrows, beaded skin garments, gambling sticks, and ceremonial objects are among the articles received by the department of anthropology. A unique piece is a blanket of mountain goat's wool from the Tulalip Reservation.

A PAINTING of a herd of buffalo, with Pike's Peak in the background, by Titian Ramsay Peale (an account of whose career and works appeared in the March, 1917, number of the JOURNAL), is a recent accession of the Museum through the generosity of Mr. John M. Hoffmire, of Newark, N. J., and Mr. Charles W. MacMullen, of New York City, nephews of Mr. Peale. The picture was painted in 1854 from a sketch made by the artist in 1819, when he was naturalist on Long's expedition to the Rocky Mountains. It is the largest of his paintings, and is of interest as representing what is perhaps the earliest sketch of Pike's Peak.

A HANDBOOK of Peruvian art, prepared by Mr. Charles W. Mead, has been in greater demand by the public since its recent issue than any other handbook of the American Museum except the one on butterflies. The pamphlet contains five plates illustrating the fish, bird, puma, human, and mythological designs to be found on Peruvian pottery and textiles. A full explanation of each of these designs is given in the text.

RELIEF maps, models, and photographs of the Catskill Mountain water-supply system for New York City may be seen on the fourth floor of the American Museum. The city of New York uses 615,000,000 gallons of water daily, and with the population increasing at the rate of 157,000 a year and needing 100 gallons of water for each person, it is evident that the water supply is an important problem. By the completion of the Ashokan reservoir, the first of the artificial storage lakes in the Catskill Mountains, 250,000,000 gallons daily have been added to the permanent water resources which can be depended upon by the city in the most prolonged series of dry years likely to occur. The great engineering project of bringing the water from the Catskills to New York City was begun in 1907. The system ranks among the greatest of waterworks, ancient or modern, and for magnitude, cost, and complexity of physical problems, stands with the great canals and railroad systems of the world. The part now completed constitutes three quarters of the whole and embraces the Ashokan reservoir, an artificial lake twelve miles long, the Catskill aqueduct, extending ninety-two miles from this reservoir to the city's northern boundary and thirty-five miles within the city's limits, including the branch to the borough of Queens, Kensico storage reservoir near White Plains, Hill View equalizing reservoir at the city line, and Silver Lake terminal reservoir on Staten Island. The water of the new system flows from gathering grounds much higher than the city, force of gravity alone providing sufficient pressure. This is one of its great advantages, as the necessity for costly pumping is obviated. The large aqueduct through which the water flows is of sufficient capacity to deliver 600,000,000 gallons daily. Kensico reservoir, of which a model is shown, offers provision for storing a large quantity of water near the city. From the Ashokan reservoir the water, at the average velocity, takes almost three days to travel to the Silver Lake terminal on Staten Island, during which journey it flows along many a steep hillside, crosses several broad plains, pierces mountains, descends beneath rivers and wide deep valleys, traverses the boroughs of the Bronx, Manhattan, and Brooklyn, and crosses the narrows of New York Harbor.

To emphasize the features of Dr. Clark Wissler's new publication, *The American Indian*, a special two-case exhibit has been installed on the main floor of the American Museum near the west assembly hall. The display is designed to portray the somatic or bodily characters of the American Indian, and to show his relation not only to mankind in general, but more particularly to the Asiatic mongoloids. This is done by means of life masks, skulls, hair samples, photographs, and charts. The subject matter of the labels is taken from Dr. Wissler's book, which forms the nucleus of the exhibit.

THE American Anthropological Association and the American Folk-Lore Society met in joint convention at Philadelphia December 27–29. The sessions were held in the auditorium of the University Museum. Professor A. L. Kroeber, now of the American Museum scientific staff, presided. The anthropological department of the American Museum was further represented by Dr. Clark Wissler, Dr. P. E. Goddard, and Mr. N. C. Nelson. A dinner was given on the evening of December 27 in honor of Dr. Wissler, in appreciation of his recent publication, *The American Indian*. This book was the theme of the after dinner discussion, which Dr. A. H. Goldenweiser opened by giving a brief analytical summary of the work.

MR. HARRY PIERS, curator of the Provincial Museum at Halifax, reports that the specimens and labels of the Museum apparently came through the recent disaster in that city in far better condition than could have been expected. Windows were blown in and the glass of cases was smashed, water pipes burst, and snow drove disastrously in at one end of the building. Mr. Piers calls attention to their good fortune in having used waterproof ink for labels. The cases were boarded over soon after the explosion in order to make them available as tables for Red Cross relief supplies, thus preventing a very careful examination of the damage to date.

THAT the December number of the JOURNAL did not reach subscribers by the middle of the month was due to its detention in the New York Post Office, pending investigation of an alleged violation of post office requirements. A telegram from Washington finally released the issue.

THROUGH the courtesy of the United States Bureau of Fisheries there has been added to the exhibits of the shell hall of the American Museum a full series of photographic enlargements illustrating the button industry —from the work of the pearl mussel fisheries of the Mississippi River to the finished buttons. The pictures show mussel dredges of various types at work; the shellers' camp; transportation of the shells by scow to the button factories; and scenes within the factories. From the shells are cut the "blanks," the foundations of buttons. The finishing process includes grinding to obtain an even surface, turning to form the button and depress its center, drilling the holes, polishing in kegs of chemicals to give luster, washing, sorting, and packing. Some factories have been known to reach an output of one hundred and forty-four thousand buttons a day. Button manufacture from shells began in the United States about 1890, and rapidly increased in scope owing to the high tariff on imported buttons. The fishing season for the mussel (*Naiades*) was formerly restricted to August and December but is now continued throughout the year.

There has also been installed in the hall of shells an extensive series of objects showing the commercial uses of shells and how they are employed by Japanese craftsmen in the construction of toys, utensils, jewelry, charms, and ornaments of great delicacy and beauty. Included with this collection are gay shell baskets from the Bahama Islands, and others in which shells are combined into flowers, made for the tourist trade by the Seri Indian women of Lower California.

THE rare red ground monkey (*Erythrocebus whitei*) of Africa is the subject of a new habitat group in the American Museum. This species is shy and has habits of watchfulness and great activity which make its capture very difficult. Native hunters seldom get a chance to kill it. They therefore attribute to it the power of rendering itself invisible, and the Azande believe that the skull of the red monkey imparts this power to the fortunate possessor, who thereby is enabled to approach and slay his enemies unseen. The large baboon (*Papio doguera*) shown in the center of the new group is one of nineteen species found in Africa. This particular species ranges from the plains and forests of Uganda westward through the Congo Basin and is here displayed in connection with the red monkey because the two species live in harmony, having similar feeding habits. Like the red monkey, it is a swift runner and very difficult to catch. Most of the animals of this group were collected personally by Mr. Jenness Richardson, working under the direction of Dr. William S. Rainsford, who headed an exploring expedition to Central Africa in 1912–13. The mounting was done by Mr. Frederick Blaschke, a preparator of the Museum, and the background was painted by Mr. Albert Operti.

A second monkey group is completed. This shows the spider monkey, likewise a rare species. Spider monkeys are dark brown, with small bodies and long slender legs, appearing, when seen at a distance in a tropical jungle, like huge spiders. They are sluggish in movement, timid, good-natured, and very quiet. They have no thumb, but make up for this deficiency by having a prehensile tail which serves the purpose of an additional hand. The variety shown in the group is found throughout the greater part of Guatemala and northward, east of the mountains, through the state of Vera Cruz, Mexico. The group is the joint work of Messrs. Frederick Blaschke and William B. Peters. These two groups, representing the Old World and the New, mark progress in the making over of the hall of Primates.

THE report on the collection of lizards, made by the American Museum Congo Expedition during its six years' stay in Africa, is nearing completion. This collection of fifteen hundred lizards is the largest ever brought from Africa by a single expedition, although collections from the richer lacertilian fauna of South Africa and from the West African islands have exceeded it in number of species. In the 18 genera and 44 species recorded, all of the central African families of lizards are represented, with the exception of the Amphisbænidæ. Nine forms are described as new, of which three are geckos, three lacertids, and two chameleons. Three others of the species have each been known previously from a single type specimen, and an additional ten are rare in collections. The large series of the Scincidæ, making possible a careful delimitation of the species in that group, and the great extensions of the range of many species probably are of even greater value and interest than the new forms. Among the turtles and

crocodiles collected in the Ituri the most interesting is a new genus of crocodile, related to the west African *Osteolæmus*. The work is in the hands of Mr. Karl P. Schmidt, research assistant in herpetology in the American Museum.

PROFESSOR A. L. KROEBER, of the University of California, has come to the American Museum of Natural History as associate curator in the department of anthropology. Professor Kroeber will be with the Museum for six months, exchanging with Dr. Robert H. Lowie, who is now on leave of absence at the University of California.

THAT there is an abundance of material in our Museums from which to supply an indefinite number of artistic textile patterns is becoming more and more evident since manufacturers no longer are able to send artists abroad for designs and are forced to use the resources at command in America. The recent exhibit in the west assembly hall of the Museum fully demonstrated this fact by the number and variety of designs. Work was sent to the Museum from the public schools of Paterson, N. J., and of New York City, from Pratt Institute, Brooklyn, Teachers College of Columbia University, Hunter College, and the Art Department of the Young Women's Christian Association.

AN exhibit of clothing, to which the attention of the costume industry is being especially invited, has been arranged in the Philippine hall of the American Museum for the two weeks from January 3 to 17. About one hundred and fifty handsomely beaded and embroidered garments from the Chinese, Burmese, African, Mexican, Philippine, and American Indian collections are displayed, with a view to demonstrating the artistic possibilities which lie in these products of primitive peoples.

NOTWITHSTANDING the fact that a spider web is so fine and delicate that unless covered with dust or sparkling with dew it is almost invisible, the Museum is now displaying a series of these webs, twelve in number, so mounted on dark backgrounds as to be plainly visible. The spiral construction, widening gradually from the center outward, is easily traced. The webs are accompanied by colored plates of the spiders which spun them. Some spiders live in the web they spin; others spend only the nights there, hiding during the day in retreats often some distance away, with a single thread leading to the web. One of the larger spiders, *Aranea trifolium*, for instance, spins a thread from the center of its web to a tent made of leaves and silk. Sitting in this tent, the spider holds the thread in such a way that it knows when the web is shaken by its insect prey.

A NEW canned fish product, known as grayfish, is on the market and is recommended by the United States Bureau of Fisheries. Analyses have shown that the grayfish contains three times the amount of ammonia nitrogen found in an ordinary food fish, and unless this is eliminated in preparing it for the table, the fish is likely to fall short of proper appreciation. This substance can be removed easily by soaking or cooking the fish in vinegar and water before it is finally made ready. In any event, grayfish should be cooked thoroughly after being taken from the can. Also, it seems that this fish lacks the proper amount of oil. The oil very probably is contained in the liver, which of course is not canned. The fish, therefore, is more palatable when cooked with some fat, such as olive oil, butter, or cream. It may not seem worth while to take so much trouble in the preparation of a new product—which brings to mind the fact that for a time after the potato was introduced into the Old World it was little thought of as a food plant, because people were ignorant of how properly to utilize it.

DR. W. L. HILDBURGH has presented to the American Museum a very carefully selected collection of archæological objects from New York State, containing some fine Iroquois pots and pipes. This gift makes the exhibition and study collections for New York adequately represented in the Museum. Dr. Hildburgh has resided for a number of years in England and has made a large place for himself among English anthropologists.

DR. T. MITCHELL PRUDDEN, who has spent many years in the study of the small ruins of southern Colorado, has presented to the American Museum a collection of pottery and other objects acquired during the course of his work. The specimens are accompanied by two models representing the exterior and interior of the small dwellings whose exact relationship to the larger pueblos and cliff dwellings of the Southwest is not yet evident.